The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXI. No. 528 AUGUST 10, 1929 Prepaid Annual Subscription: United Kingdom, £1.1.0; Abroad, £1.6.0

Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE *is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders, and Postal Orders should be made payable to Benn Brothers, Ltd.*

Benn Brothers, Ltd., proprietors of THE CHEMICAL AGE, *have for some years past adopted the five-day week, and the editorial and general offices (Bouverie House, 154, Fleet Street, London, E.C.4) are closed on Saturdays.*

Telegrams: "Allangas, Fleet, London." Telephone: City 0244

Alkali Works Problems

THIS week we complete our summary of the annual reports of the Chief Inspectors of alkali works by some passages from the report of Mr. J. W. Young, the Scottish inspector. These reports, taken together, constitute a document of great interest and value in their notes on works processes, on troubles caused by effluents, fumes and dust, and on the technical and commercial conditions of the industry. They deserve the careful study of works managers and technologists and the directorates under whom they work.

Occasionally, incidental disclosures are come across where one least expects them. There is, for example, in the Scottish report, a curious remark concerning the size of sulphate crystals, a problem which has been the subject of much research and experiment by experts in by-product sulphate production. When it was found that Germany was producing sulphate in a pea crystal form that proved very popular in certain overseas markets, attention was drawn to the need of greater care in this matter, and there was some interesting controversy as to the methods of controlling crystal formation and producing something different from the ordinary form. Some of the Scottish workers appear to have solved this problem in their own summary fashion, so far at least as the production of small crystals is concerned.

In one case where the attention of the inspector was drawn casually to the too small size of the crystals the explanation offered was a very human one. It was noticed that when the men desired to complete their shift quickly, coincidently the grain grew less, and this was found to be due to the still and saturator receiving excessive steam. In this practical way the men had applied their empirical knowledge to suit their own convenience. If this excess tends to keep the grain size down, a diminution of the cause should logically tend to enlargement, but on this interesting point it would be well to have the opinion of some competent authority. The use of sieves, it is stated, built up of wires running uncrossed and in one direction only, continues to extend. This form is found to be less liable to become clogged, and it also allows passage to elongated crystals.

Gasworks production of sulphate and liquor ammonia is reported to be on the increase, but production from other sources is declining. The tendency of the smaller works, indeed, is to abandon manufacture as unprofitable; a few import crude liquor from their neighbours without cost, except for transport.

As with the report for England and Wales, so with the report for Scotland—the attention of the inspectors has been very largely occupied with complaints as to nuisance. Two causes appear to be contributory. The first is the development of new or the expansion of old industries, of which cement manufacture is one example; the second is the greater sensitivity of the public to unpleasant effects produced in works and public insistence on a stricter standard of preventive methods. The electrostatic process for the recovery of dust from chimney gases is well spoken of. In the case of a cement kiln at Wishaw the process was so efficient that a temporary interruption was noticed at once by the neighbours of the works.

It is clear that these problems of nuisance prevention are attracting greatly increased attention, and will continue to do so more and more in the future. Like all problems, ways of treating them will be found when it is made clear that such ways must be found and applied. Mr. Arthur Reavell is merely looking a stage ahead, as it is the duty of the alert engineer always to do, when he predicts that the chemical engineer has an increasing field here for the application of his special knowledge and experience. Similarly, the alert works manager or director, recognising the trend of opinion, will be wise to anticipate and meet the stricter demands of the present day instead of waiting until he has to yield to pressure or actual compulsion.

The Freezing Point of Explosives

ACCORDING to Dr. C. E. Munroe, chief explosives chemist to the United States Bureau of Mines, the production of low-freezing explosives, as the result of increased chemical knowledge, has greatly increased the safety factor in the mining industry. Frozen dynamite may prove a very dangerous substance. Users of dynamites have been strenuously warned against it and advised to store their dynamite in such a manner as to prevent its becoming frozen, or, if it becomes frozen, to thaw it before use. In making dynamite, the nitroglycerin content is simply mixed with the other ingredients of the dynamite. In making explosive gelatin some soluble cellulose nitrate is dissolved in the nitroglycerin. In neither case does the nitroglycerin undergo any chemical change. It still retains all its properties, among which is its capacity to freeze at 56° F. Hence the dynamites, explosive gelatins, and gelatin dynamites will freeze by exposure to about 56° F. because the nitroglycerin in them freezes, unless prevented by some special protection.

In the long lists of accidents from explosives, no one cause of accident is more frequently cited than that of " attendant on thawing explosives," and though the total number of casualties may have been less than those due to mine explosions, or explosions in transportation, the actual number was really large. All the time the simplest means for the prevention of freezing was at hand, namely, the principle made use of in freezing ice cream mixtures, where a lower temperature than the freezing point of water is obtained by dissolving common sea salt in water, preferably frozen water. It is a commonplace that when salt is dissolved in water the temperature of the liquid falls below the freezing point of water and that a lower temperature is required to freeze this salt water than is required to freeze fresh water.

That this is a principle of very wide application became apparent, but its use for the reduction of the freezing points of explosives came about rather by chance observation. About 1902 much interest began to be taken in the use of the trinitrotoluenes as military explosives, especially for high explosive shell. In the nitration of toluene to prepare the desired products a considerable amount of tarry liquid residue was produced, which the manufacturers were ready to dispose of at almost any price, and as it was cheap, apparently abundant, and possessed some moderate explosive qualities, the thought occurred of incorporating some of it into dynamite dopes. The resultant dynamite developed good qualities, and in its use it was observed that it did not freeze under the conditions when other dynamites in use froze. It was not long after this that low freezing dynamites, designated as " L.F.", and containing " liquid nitrotoluenes " as a component, appeared on the market.

With the outbreak of the war in 1914 the nitration of toluene became so perfected that the " liquid nitrotoluenes " were no longer available for use in dynamites. Moreover, a growing shortage of glycerin necessitated the use of substitutes. In this event, sugars, such as cane sugar and glucose, were dissolved in the glycerin and nitrated with it, and the sucrose and glucose nitrates, thus produced, were found to depress the freezing point of the nitroglycerin. Later, polymerized glycerins, in which the residue of two or more molecules of glycerin had coalesced to form larger molecules, were dissolved in the glycerin and nitrated with it, the nitrated polyglycerins serving effectually to depress the freezing point of the nitroglycerin. The latest depressant for use is ethylene glycol dinitrate. Its introduction was determined to an extent by economic reasons, but it serves well the purpose and possesses additional characteristics of value. The ethylene glycol, which is mixed with the glycerin before nitration, is synthesised from natural gas, and there is every reason to believe that the available supply in the United States will prove abundant for many years hence.

Progress of Canadian Chemicals

THE commercial expansion of Canada, in which British interest has for some time been so much centred, is reviewed at considerable length in the report by Mr. F. W. Field, H.M. Senior Trade Commissioner in Canada, on " Financial, Industrial, and Commercial Conditions in Canada " up to April last (H.M. Stationery Office, pp. 98, 3s.). The Canadian chemical industry, as is well known, is largely centred in Ontario and Quebec. The capital employed in it is about $135 million. The output in 1927, the latest year for which official figures are available, was $127½ million, the highest value reported since the close of the war. The most important group, accounting for $30¾ million, is production of acids, alkalis, salts, and compressed gases. Paints, pigments, and varnishes were responsible for $25¼ million of production. Soaps, washing compounds, and toilet preparations accounted for $19 million, medicinal and pharmaceutical preparations for $16¼ million, the miscellaneous chemicals industry for $12 million, coal tar and its products $3¾ million, inks, dyes, and colours for $3¼ million. The output value of the fertiliser industry was $1¾ million, and explosives, ammunition, fireworks, and matches $13 million. The one exception in the list of industries showing improvements was the wood distillates and extracts industry with an output of $1½ million, or slightly less than in 1926.

One of the outstanding developments in the chemical industries is the substitution of nitrocellulose lacquers for varnish by the motor car manufacturers and the manufacture in Canada of the principal solvents required for the lacquers. There has been a substantial increase in the production of acetic acid, which is used extensively in making solvent acetates. Other important developments have been the improved volume and consumption in most lines, increased production of chemical and allied processed materials, and a higher degree of public appreciation of the significance of chemical research as a factor in industrial expansion.

In 1928 Canadian Industries, Ltd., extended its field of activities to the heavy chemical and fertiliser industries. This is in line with its general policy, which is to effect Canadian developments corresponding with those which have been made by its associated companies in Great Britain and the United States.

Conveying Chemicals with Portable Loaders

An Outline of American Practice

The following authoritative article, which gives an excellent account of methods of conveying chemicals in vogue in the United States, is written by Mr. M. H. Kidder, of the Link-Belt Co., and should be of great interest to British readers. It appeared recently in "Chemical Markets."

ELEVATING and conveying machinery has proved its economy and efficiency in various industries where volume has been sufficient to require its use. There are plants, however, which do not lend themselves to the use of complete elevating or conveying systems. Users of such plants have found that by using portable loaders in various places in their production system the cost of the portable unit was soon paid for out of savings in labour and increased production.

Portable loaders fall into five separate classifications: *i.e.*, portable belt conveyors, portable bucket loaders, portable box car loaders, power-propelled crawler loaders, and portable bag pilers.

Portable Belt Conveyors

The portable belt conveyor is used for handling dry and lumpy chemicals similar to sand and coal. It is also used for handling fertiliser materials such as bones and bagged materials, and in some cases for conveying the dry mix from one place to another in the plant. It has an adjustable discharge height; and the conveying belt is usually 18 in. wide, sometimes being fitted with cleats suitably spaced across its width, to keep larger pieces from rolling or sliding back. These conveyors usually have a conveying length of 21 to 31 ft.

One fertiliser manufacturer in Chicago uses three portable belt conveyors for different jobs around the plant. The machines are used in tandem in handling tankage to and from the storage piles to their conveyor system. This company has a complete elevating and conveying system, but, to increase the storage capacity of its space, the portable loader is placed with its feed-end near the permanent conveyor system, where a man shovels from the permanent conveyor on to the foot-end of the portable loader, which discharges on to the foot-end of another portable loader, which in turn discharges on to the storage pile. As the storage pile is built up, the second portable conveyor is taken away and the pile is then built from one conveyor. In this manner, the permanent conveyors need be spaced only 100 ft. apart instead of within a "shovel throw" of about 10 ft. In this instance, labour saving is estimated at six man-hours per conveyor hour, besides increasing capacity of the storage piles. This fertiliser plant is receiving a sizeable return on its investment, as the maintenance cost is small, and nothing has been spent for repairs.

A chemical plant in Chicago utilises a portable belt conveyor mainly for handling coal, which is unloaded from the car to storage by one man and a portable conveyor. It takes but three to four hours to unload a car in this way, and eliminates four men, as well as any dunnage charges accumulating through delays in unloading. In a certain glue plant, a 21 ft. portable belt conveyor handles steam bone from storage piles to cars. A permanent conveying system carries the steam bone from the tanks to the outside storage piles, from which it is loaded into the cars by the portable conveyor. Of course, in this plant they have complete elevating and conveying equipment, but they have found the portable loader an indispensable medium in their production system.

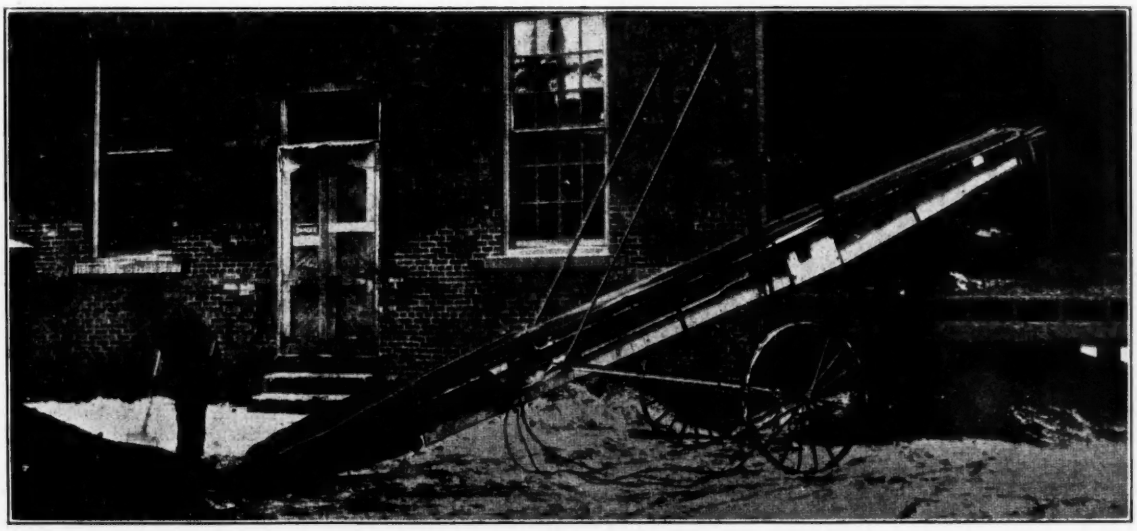
The Portable Bucket Loader

The portable bucket loader is made both mechanical- and hand-operated for transporting around the yard. We stress the hand-operated type of loader, as it is the most commonly used. It was developed to satisfy the demand for a small hand-propelled machine for use in certain sections of large plants, as well as in the smaller dry-mixing plants. A five horse-power motor operates the elevator mechanism. An especially desirable feature is the arrangement and placing of the buckets to avoid any possibility of the material (particularly acid phosphate) accumulating in the chain links or being jammed against the backs of the buckets or the sprocket teeth. This machine saves from five to seven labourers in filling buggies, and does the work faster.

The portable box car loader is made in three styles—for handling sand, salt and similar materials; for handling lump lime, ores, and other lumpy materials; for superphosphate and materials of a gummy nature. With a box car loader and one man, a box car may be loaded within an hour. It has been reported that it is possible to load forty tons of sand into a car without a shovel. One man can set the loader into position, fill one end of the car, reverse the loader and fill the other end. This replaces the costly wheel-barrow-plank-back-breaking way.

The Crawler Loader

The power-propelled crawler loader crawls in any direction, backs right up against the material; digs; feeds itself; and loads; and it performs these operations with astonishing speed. Built for the rough loading job, it is ideally adapted for handling oxide, fertiliser, acid phosphate and similar materials. The loader is easy to operate, requiring only one man. He has a clear view and rides with the loader on a roomy side



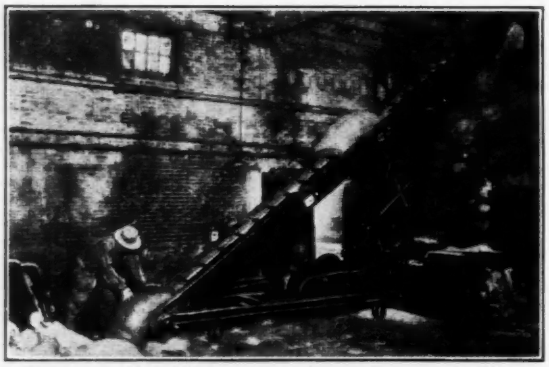
A PORTABLE BELT CONVEYOR HANDLING OXIDE FROM GROUND TO PLATFORM.

platform, where all levers are handy. The machine can travel forward and reverse; and turn right or left when travelling in either direction. The starting, turning and stopping of the crawler are all controlled by two hand levers, which automatically apply brakes when stopping. The elevator is controlled by a separate hand lever, which operates a steel clutch and disengages automatically when the machine is started

A Portable Bucket-Loader Delivering Superphosphate.

in reverse. The loader is composed of four units; *i.e.*, the elevator, the chassis, the power plant and the crawler. The machine is made collapsible to clear low overhead trolley wires, bridges, etc., in moving from one location to another. It operates from a simple, compact gasoline power unit of 30 h.p. at 1,200 r.p.m., equipped with a governor to regulate the feed automatically, or with electric equipment to suit the conditions. It has a capacity of 1¾ yds. per minute with uniform feed, based on sand, gravel or similar material of about 1½ in. size.

At one plant where this type machine was used for reclaiming acid phosphate from bins to hand buggies (thence to elevators), the loader reduced the blasting of the pile by about 50 per cent., and entirely eliminated the need for loosening the material by means of picks. The only shovelling necessary was the cleaning up of some spilled material. Based on a daily



A Portable Bag Piler which Finds Extensive Use in the Chemical Industry.

wage of $2.50 for shovellers, the saving in dynamiting, picking and shovelling was about $18.00 a day, as the loader replaced eight shovellers and four pickers, at the same time delivering the phosphate to buggies at the rate of thirty-two tons per hour. The machine could have handled fifty tons an hour just as well, but the hourly capacity of the elevator into which the buggies deliver the material was limited to thirty-two tons per hour. The expense for dynamiting was cut in half, as the power-propelled crawler loader is equipped with a screw feeder which digs its way into the pile without further aid than the original dynamite blast.

The portable bag piler, as its name implies, is used extensively for piling bags of chemicals. This completes this group of portable conveying and elevating equipment, whose use makes for economy and efficiency in the handling of certain types of materials in the chemical plant.

Institution of Chemical Engineers

List of Recent Elections

The following is a list of recent elections of members, associate members, graduates and students. The Institution may be congratulated on the consistent growth that the figures indicate:—

Members.—William Bacon, B.Sc., F.I.C., technical consultant, London; John William Craggs, R. Bowran and Co., Ltd., Pelaw-on-Tyne; John Edwards, B.Sc., A.I.C., Wm. Butler and Co. (Bristol), Ltd.; Ernest Leese, Wilson's (N.Z.) Portland Cement Co., Ltd., North Auckland, N.Z.; Harold Adolphus Morfey, Shelton Iron, Steel and Coal Co., Stoke-on-Trent; William Thompson, A.M.I.Mech.E., John Thompson (Dudley), Ltd.; Prof. Norman Thomas Mortimer Wilsmore, D.Sc., F.I.C., University of Western Australia, Perth; Thomas Owston Wilton, A.M.I.E.E., Chemical Engineering and Wilton's Patent Furnace Co., Ltd., London.

Associate-Members.—James Knipes Dickie, Auchengeich Coke Oven and Gas Supply Plant, Chryston, Glasgow; Prof. Charles Forrester, F.I.C., Indian School of Mines, Dhanbad, India; Timothy Joseph Horgan, B.Eng., A.R.C.Sc.I., Edgar Allen and Co., Ltd., Sheffield; Alfred Leslie Julian, Callard and Co., Southfields; Archibald Knox, A.I.C., Brand's Pure Spelter Co., Ltd., and Kyle Chemical Co., Ltd., Irvine; Charles Henry Whatmore, Chemical Works, E.I.D. and S.F., Ranipet, South India.

Graduates.—Alfred George Isherwood Anderson, Gas Department, Renfrew; Laurence Walter Blundell, M.Sc., A.R.C.S., D.I.C., Gas Light and Coke Co., Beckton, London; James Galloway, Glasgow Corporation Chemical Works; William Aldred Hayward, M.Sc., A.I.C., University College, London; Waldemar Adrian Phillips Hoskin, Chemical Engineering and Wilton's Patent Furnace Co., Ltd., London; Frank Arthur Lyall, B.Sc., Joseph Foster and Sons, Blackburn; Ian Bruce McCrae, B.Sc., University College, London; William Alexander Hugh Oswald, B.A., Anglo-American Oil Co., Ltd., London; Josiah Dawe Parsons, B.Sc., A.R.C.S., Imperial College of Science and Technology, London; Sydney Parker Roach, B.Sc., Imperial College of Science and Technology, London.

Students.—Walter Frederick Loates, A. Boake, Roberts and Co., Ltd., London; Jan Adolph Maria von Moll, Eindhoven, Holland.

Transfers

To Membership.—Godfrey Wilfred Himus, B.Sc., A.R.C.S, D.I.C., A.I.C., Imperial College of Science and Technology, London; Edward Kinsella, A.M.I.Mech.E., British Celanese, Ltd., Spondon.

To Graduateship.—Charles Swainson Davies, Gas Department, Chesterfield; Jacob Mendelsohn, B.Sc., University of the Witwatersrand, Johannesburg, South Africa; William Edward Rees-Evans, Sundon Cement Works, Luton.

Ceramic Society Autumn Meeting

The autumn meeting of the Refractory Materials Section and the Building Materials Section of the Ceramic Society will be a joint meeting to be held in London either on September 11 and 12, or the 18 and 19, but the latter date is the more probable one. The meeting will also be a reunion of those who took part in the visit to the United States and Canada, and in this connection Mr. F. West will give a special paper to both sections, entitled: "Notes on the American trip," which will be illustrated with lantern slides and a cinematograph film; in addition, Mr. G. A. Hodson will give a paper to the Building Materials Section on special points of interest in the American trip relating to that branch of the industry. Each section also has a series of technical papers, and visits will be paid to the National Physical Laboratory, Teddington, and the Building Research Station, Garston. There will also be an official banquet, followed by a dance.

Alkali Works in Scotland

Report of Chief Inspector for Past Year

MR. J. W. YOUNG, Chief Inspector for Scotland under the Alkali Works Regulation Act, 1906, in the course of his report for the past year, just issued by H.M. Stationery Office, states :—

The number of works registered was 142, in which were operated 285 scheduled processes as follows : 6 alkali (saltcake), 1 alkali (wet copper), 2 smelting, 18 sulphuric acid, 11 sulphuric acid (Class II), 19 chemical manure, 14 gas liquor, 5 nitric acid, 100 sulphate and muriate of ammonia, 4 chlorine, 2 muriatic acid, 10 sulphide, 1 alkali waste, 10 lead deposit, 1 arsenic, 5 nitrate and chloride of iron, 1 carbon bisulphide, 3 paraffin oil, 11 bisulphite, 60 tar, and 1 zinc extraction. Three hundred and ninety visits were made to these works, involving 252 chemical tests. In no case were exceeded the limits of acidity prescribed by the Act, nor have legal proceedings been taken.

Raw Materials and Products

By the courtesy of manufacturers, I am able to present the usual summary of raw materials and of products.

Pyrites, blende and spent oxide burned for sulphuric acid :—

In 1928	91,647 tons
In 1927	97,495 ,,

Phosphates and bones dissolved for fertilisers :—

In 1928	46,663 tons
In 1927	43,161 ,,

	Salts of ammonia. Tons.	Tar distilled. Tons.	Pitch produced. Tons.
From gas works	20,364	140,664	33,821
,, iron works	3,053	59,146	20,523
,, coke ovens	7,407	15,768	6,614
,, producer gas and bone works	5,265	8,780	5,485
,, shale works	36,036	—	—
Total 1928.....	72,725	224,358	66,443
In 1927	73,858	200,051	68,152

The ammonia is expressed as pure sulphate ; 3,772 tons were obtained as concentrated liquor ammonia, and 354 tons as ammonium chloride. Eighty-eight thousand tons of tar were dehydrated and partially distilled for road purposes. The tar from gas and iron works has thus increased by about 14 per cent. during 1928, but from coke ovens has fallen by about 8 per cent.

Public Complaints

Public complaints have been more frequent than usual. In an alkali work saltcake furnaces lie near its boundary—a high wall. On the outer side is a small inhabited house with its laundry ; cotton materials became tender while hung up to dry after being washed, and chemical fumes were blamed. Escape of hydrochloric acid gas from the furnace at low level had been only small, but it was found possible to improve the draught and regulation of the furnace, and also to shield the drying ground.

A charge against a sulphuric acid work, by a local official, of emitting offensive odours was unconnected with any scheduled process, and its foundation is unknown. The electrostatic recovery of dust from the chimney gases of the cement kiln at Wishaw has been so efficient that a temporary interruption was speedily noticed by the neighbours of the works. Damage to flowers and vegetables in gardens near to a sulphuric acid work was attributed, in absence of other probable causes, to fumes from the work. Plant had been idle and under repair ; on restarting, progress to control was slow and incomplete. Zinc fumes again have caused grave annoyance at Irvine. Observation confirmed the justice of public complaint. There is reason to regard the emission of fume as somewhat less than in former years, and also that it will be still less in future.

A fatality occurred at a chemical manure work. The dead man, in company with several others, had been engaged in dissolving bonemeal in dilute sulphuric acid—an operation generally considered by no means dangerous. It is possible that this case provides yet another instance of pneumonia, rapidly fatal, induced by exposure to nitrogen peroxide. A trace of this gas is often present in commercial acid, and is variable in its effect on individuals.

Demand for hydrochloric acid has continued to be steady, with a slight increase in weight of salt decomposed. There has been marked improvement so as to arrest escape of acid gas at low level ; at two works such an escape had been subject of complaint. At another work a condenser collapsed and for some months was out of action, but there was sufficient reserve to continue operations. Plant has been well maintained. The general average amount of hydrochloric acid discharged into the air in each cubic foot of chimney gases was 0·04 grain, the highest and lowest averages for any one work being 0·10 and 0·02 respectively.

Sulphuric Acid

Pyrites burned during last year was by 7,000 tons less than before. The improved state in which it is now delivered, ready broken and free from " smalls," economises labour and promotes efficiency. Much plant has been idle ; repairs and renewals have been well maintained in the too ample periods of leisure. Cooling of strong acid supplied to Gay-Lussac towers is still sometimes inadequate.

The general average acidity in each cubic foot of residual gases discharged by sulphuric acid works was 0·55 grain of sulphuric anhydride ; the highest and lowest averages for any one work were 1·05 and 0·28 respectively : figures scarcely differing from those of the last report. The average acidity of residual gases discharged from the Class II, that is, the contact process, has increased by 0·76 grain and indicates the need for improvement. It is expected that alterations will soon be made. From the other processes of Class II, that is the concentration of weak acid, the general average acidity was again 0·4 grain of sulphuric anhydride.

Chemical Manure

The increase in the weight of phosphatic material dissolved was 8 per cent. It will be encouraging to manufacturers now struggling against adverse conditions. Plant has been generally kept in good order and has been carefully operated. In one work it was necessary to request immediate improvement : distribution of water to the wash-towers had been seriously impaired. These washtowers are provided to absorb in water the corrosive gases evolved through the action of acid on mineral phosphate. The effect of corrosion upon the sprays and pipes had been forgotten, so that condensation of fumes was inadequate until the sprays and pipes had been restored. The condensation in the washtowers of different works varied from 99·6 to 96·7 per cent. The general average of the total acid in each cubic foot of gases escaping finally was 0·07 grain, expressed as the SO_3 equivalent of hydrofluosilicic acid.

Nitric Acid

Production of nitric acid by oxidation of ammonia instead of through decomposition of saltpetre has increased. Plant is now available to supply the present needs of industry, although the older process also continues in use.

Sulphate and Muriate of Ammonia and Gas Liquor

From gasworks, production of sulphate and liquor ammonia increased, but was less from other sources. The smaller works still tend to abandon manufacture as unprofitable ; a few are importing crude liquor from their neighbours, without cost, except of transport. There has been small occasion for blame, rather there has been general improvement both in plant and practice ; but again it has been necessary to warn managers as to leakages of dangerous gases, the more frequent fault being at the connection of pipes to the bell of saturators.

Irritation of skin and eyes is said to have been caused by exposure to the warmed air, charged with fine dust of sulphate, proceeding from the dryer. It has been found of benefit, where it is inconvenient to deliver outside, to wash this warm air and recover the sulphate that it is bearing away.

A reason was given me for crystals being of too small a size—when men desired to complete their shift quickly, coincidently the grain grew less, because still and saturator received excessive steam. The use of sieves, built up of wires running uncrossed and in one direction only, extends. This form is less liable to become clogged, and also allows passage to elongated crystals. At a work with two preheaters, fitted for alternative

service, it was found that the smaller was by much the more efficient to heat crude liquor on its course to the still. But the tubes of the smaller preheater were less in diameter and more numerous. The familiar cause of defective service is from choked or leaky tubes.

Tar Distillation

The weight of tar distilled has increased by over 24,000 tons. There have been no complaints. Several stills have been replaced by those of improved pattern, in which heat is transferred from the cooling distillate to incoming raw tar. The device of an inverted weir, placed transversely across the upper part of the pitch-cooler, has been used by the manager of a large work to prevent escape of fumes from hot pitch discharged from stills. This simple remedy is quite successful. It is said that producer gas is the best fuel wherewith to heat stills; a range of six is to be seen bearing but one patch among them during nearly 20 years.

Zinc

There is little to add to my earlier remarks and to reports of former years. Such appliances as are possible with the existing process are supplied in full and diligently used; power to restrain by them the escape of fume is but small. Investigation is proceeding of other processes claiming superior economy and condensation of the vapour of zinc.

Cases of Industrial Poisoning in 1928

Report of Inspector of Factories and Workshops

The "Annual Report of the Chief Inspector of Factories and Workshops for the Year 1928" has just been issued (H.M. Stationery Office, pp. 149, 2s. 6d.). Below is given a summary of the sections of the report dealing with cases of poisoning.

DURING the year the notifications of industrial poisoning included the following: Lead poisoning, 326 (43 deaths); mercurial poisoning, 4; arsenical poisoning, 2 (1 death); carbon bisulphide poisoning, 1; aniline poisoning, 41; chrome ulceration, 70; toxic jaundice, 6.

Mercury

The new process of printing, involving the use of mercury, has been kept under observation. No symptoms of mercurial poisoning have been observed, nor have any cases of mercurial poisoning been reported. Of the four reported cases of mercurial poisoning, three occurred in the manufacture of thermometers, and the other in the manufacture of electric meters.

Aniline

Fifteen of the forty-one cases occurred in the months of June, July and August, to some extent indicating the influence of the hot weather in the production of poisoning. The forty-one cases reported were due to the following causes: Making intermediates (D.N.B., D.N.T., T.N.T.), 14; making aniline colours and dyes, 8; making aniline, 6; aniline black dyeing, 4; paranitraniline powder, 2; toluidine, 2; splashing of aniline oil, 1; others, 4.

One of the most severe of these cases was due to the accidental splashing of the clothing of the workman with aniline oil. The man removed his outer clothing only, and did not take a bath, apparently not suspecting that his underclothing was splashed as well. The necessity for removing all clothing and taking a bath, under such circumstances, is emphasised to workers by the Official Cautionary Placard, and had these precautions been taken the case would probably have been of a much less severe character. A further case was reported of a laundry worker using an ink remover containing aniline oil. The worker had upset a bottle of marking ink over some clothes, and for an hour afterwards used a considerable quantity of the ink remover. Shortly afterwards she became giddy and faint, and complained of headache, and there was some cyanosis. The illness was moderately severe.

Toxic Jaundice and Arseniuretted Hydrogen

Six cases of toxic jaundice were notified due to the inhalation of arseniuretted hydrogen gas. Two of these call for no special comment, as the manufacture of zinc salts, in which they occurred, is such that if arsenic is present in the metal or acid, poisoning by this gas is always liable to occur. These two cases follow those reported in detail last year, and the measures taken on the advice of Mr. Thomas, the District Inspector, would appear to have reduced the liability of the occurrence of such intoxication.

There are occasions when evolution cannot be anticipated. This is instanced by the four other cases of arseniuretted hydrogen poisoning investigated by Dr. Henry. At a factory an experiment was made of stirring sawdust with a power agitator in an open tank containing molten tin, so as to open out the dross and prevent the inclusion of pure metal. During the process much smoke was evolved, and a curious odour was observed. Of the fifteen men who were present, including a craneman working overhead, ten were affected by the fumes which were emitted. In four who had to cease work, dizziness, headache, hæmaturia and jaundice occurred. In six others who did not cease work, transient hæmaturia for two days, with dizziness, occurred in one; the other five had symptoms of dizziness and nausea. The remaining four were not affected.

The symptoms pointed to poisoning by arseniuretted hydrogen, but it was difficult to understand how such a gas could be evolved. The diagnosis was confirmed by an examination of the hair of two of the men eight weeks after the symptoms were first noted. Mr. Harry Heap, Public Analyst of the Public Health Laboratory, Manchester, who examined the hair, reported that he found 40 parts of arsenic per million in one case and 170 parts per million in the other. An analysis of the skimmings from the tank showed 0·29 per cent. of arsenic, and it would therefore appear that some acid content of the wood when heated was able to liberate nascent hydrogen leading to the formation of arseniuretted hydrogen.

Chrome Ulceration

Seventy cases of chrome ulceration were notified, twenty-eight of these in the dyeing and finishing industry and seventeen in the process of chromium plating. This latter industry is undoubtedly on the increase, and the effects of a solution of chrome on the skin and mucous membranes are not yet fully realised by employers. The majority of the works where this process is carried on have been visited, and instructions given with a view to minimising these effects of chrome. Reports on many cases show neglect to have the hands of workers examined bi-weekly—a very valuable preventive measure if carried out efficiently.

Fumes and Gases

The reported cases of gassing included the following:—Carbon monoxide, 81 (9 deaths); carbon dioxide, 8 (one death); sulphuretted hydrogen, 9 (3 deaths); sulphur dioxide, 10; chlorine, 17; nitrous fumes, 6 (one death); ammonia, 12 (one death); benzol, benzine, etc., 7 (2 deaths); other, 17 (2 deaths).

Sulphuretted Hydrogen

Nine cases were reported, with three fatalities. All of the cases occurred in chemical works. Of the three fatal cases, one was due to a faulty arrangement for introducing acid into a liquor containing sodium sulphide. The vessel containing sulphuric acid was fitted with a bung, through which was inserted a glass tube, attached to which was a rubber tube fitted with a clip, so that the acid could be run in slowly. The vessel containing the acid was tilted, loosening the bung and causing a rush of acid into the vat containing the liquor, with the result that a large volume of hydrogen sulphide was generated. The accident was entirely due to the crude arrangement in a semi-experimental plant. Seeing that the evolution of hydrogen sulphide was inevitable should an excess of acid get into the liquor, a better apparatus ought to have been installed before the process was commenced.

Another fatal accident occurred in a very similar manner, where the charge of acid, instead of being fed in slowly over a period of hours, was tipped in all at once, with the result that there was a violent evolution of hydrogen sulphide. This plant was again experimental and was under the immediate supervision of the chemist. The man affected unfortunately carried out the operation without instructions from the

chemist, who happened to be absent for a short time in the laboratory. The third fatal case was due to the evolution of hydrogen sulphide in a benzol washing process.

Chlorine

Seven of the 17 cases reported occurred either in the manufacture of bleaching powder or in connection with its use ; four of them in an experimental process for the bleaching of cotton. Two were due to leaky valves or connections of chlorine cylinders (one in a flour mill), and two cases occurred in connection with the bleaching and dyeing of artificial silk.

Nitrous Fumes

Of the six cases reported, three were due to the escape of these fumes in chemical works ; and one in an experimental process in dyeing, where a considerable quantity of fume was given off, fortunately without very serious effects. The process was not continued until adequate precautions were taken to protect the workers from danger. The fatal case occurred to a man engaged in adding sulphuric acid to bone meal in a mixer. Dr. Mereweather, who investigated the case, expressed the opinion that the escape of nitrous fumes was due to two causes—the exhaust plant of the mixer was inefficient, and the sulphuric acid used was of uncertain purity, due to the fact that the denitrating plant for the acid was not working efficiently. He recommended that the exhaust ventilation should be maintained at a high standard of efficiency and a regular check kept on the quality of the sulphuric acid.

Five of the 12 cases of ammonia poisoning occurred in one factory from the escape of ammonia in its manufacture. Three cases were due to the escape of gas from refrigerator plants, one of which proved fatal.

Miscellaneous

The three reported cases of phosgene poisoning (one fatal) all occurred in chemical works, due to the escape of the gas which was being passed through the plant from cylinders containing the gas. Two cases of poisoning from phosphorus oxychloride were reported, the symptoms being irritation of the respiratory passage, setting up spasmodic coughing. The cases were slight and complete recovery occurred in a few days.

Only one case of trichlorethylene poisoning was reported, under the following circumstances :—The man was descending a ladder into a vat, carrying a tin of paint ; the ladder slipped, causing him to fall, displacing his gas mask, with the result that the paint was spilled and he inhaled the fume of trichlorethylene and became unconscious.

Carbon tetrachloride has been in increasing demand recently, chiefly as an antihelmintic for veterinary work. Careless spilling of the fluid, which closely resembles in odour and chemical composition chloroform, in the filling of the capsules, was found to be leading to illness attributable to the inhalation of the fume of this drug. The symptoms complained of were sickness and headache, coming on some time after exposure to the vapour. Having regard to the possibility of a toxic effect on the liver, similar to that exercised by chloroform, an enclosed cabinet with localised exhaust was advised.

Mercury in New Zealand

Work is progressing at Ngawha Springs, near Kaikoho north of Auckland, N.Z., on the erection of buildings and plant to treat the cinnabar deposits in the leases held by Kaikohe Development, Ltd., a company registered in New Zealand with £25,000 of English capital. It is an offshoot of Imperial Chemical Industries, Ltd. The manager of the subsidiary New Zealand company is Mr. R. H. Goodwin, and Mr. William McNeill is engineer. The plant includes two rotary furnaces, required to vaporise the mercury in the ore, and condensers. The ore is in earth, and not in solid rock, and does not need crushing. The machinery will be run by an internal combustion engine, although electricity will be generated on the property for lighting purposes. A dam is now in course of construction in furtherance of a scheme for supplying the works with water, and bores are being put down with the same object. Quarters have been built for the men, and a residence has been erected for the manager. The foundations for the machinery have been made, and a great deal of grading, levelling and road making has been completed.

A Bookman's Column

The latest publication in the American Chemical Society Monograph Series is *The Pyrolysis of Carbon Compounds*, by Charles Dewitt Hurd (Chemical Catalog Co., pp. 807, $12.50). The action of heat on chemical compounds has been the subject of numerous scattered investigations, and this bulky volume, in which the recorded facts are classified, will undoubtedly be of great value as a work of reference. After an introductory chapter on the generalisations which have emerged on the subject of pyrolysis, the author proceeds to arrange the published information under the names of the various classes of compounds, *e.g.*, hydrocarbons, alcohols, ethers, etc. Chapters on the pyrolysis of petroleum, rubber and related compounds, and on polymerisations and depolymerisations, are included.

* * *

The fifth edition, revised and partly rewritten, of *Allen's Commercial Organic Analysis*, which is being edited by Mr. C. Ainsworth Mitchell, has proceeded as far as Volume VII, just issued, which deals with the vegetable alkaloids (J. and A. Churchill, pp. 869, 30s.). The various sections are as follows :—" The Vegetable Alkaloids—Introduction," by Dr. T. A. Henry ; " General Section on Alkaloids," by T. M. Sharpe ; " Aconite Alkaloids," by Dr. F. H. Carr ; " Berberine and Its Associates," by E. Horton ; " Caffeine, Tea and Coffee," by Dr. J. J. Fox and P. J. Sageman ; " Cinchona Alkaloids," by O. Chick ; " Cocaine," by S. P. Sadtler, revised by N. Evers ; " Cocoa and Chocolate," by R. Whymper ; " Nicotine and Tobacco," by R. W. Tonkin ; " Opium Alkaloids," by F. O. Taylor ; " Strychnos Alkaloids," by C. A. Mitchell ; and " The Tropine Alkaloids : Atropine and Its Allies, Tropeines and Scopoleines," by Dr. F. H. Carr.

* * *

A short time ago a notice appeared in this column of the fourth edition of Volume I of *An Introduction to the Chemistry of Plant Products*, by Drs. Paul Haas and T. G. Hill. The second edition of Volume II—Metabolic Processes—has just appeared (Longmans, Green and Co., pp. 220, 10s. 6d.). This volume aims at providing a general introduction to the problems of plant metabolism, the subject being treated under the following headings : The living plant ; the synthesis of carbohydrates ; the synthesis of fats ; the synthesis of proteins ; respiration ; and growth.

* * *

Chapman and Hall have just published Volume IX of *Organic Syntheses* (pp. 108, 8s. 6d.). The substances dealt with are as follows : Acid ammonium *o*-sulphobenzoate ; *dl*-alanine ; ammonium salt of aurin tricarboxylic acid ; anisole ; benzoyl piperidine ; *p*-bromophenacyl bromide ; *o*-bromotoluene ; *n*-butyl carbamate ; *n*-butyl *p*-toluenesulphonate ; *n*-butyryl chloride ; *o*-chlorobenzoyl chloride ; cyanoacetamide ; ethyl cinnamate ; hydrocinnamic acid ; iodobenzene ; levulinic acid ; *l*-menthone ; mercury diphenyl ; methyene bromide ; monochloromethyl ether ; β-naphthol phenylaminomethane ; *o*-nitroaniline ; nitrostyrene ; etc.

* * *

An admirable German book on the history of chemistry has just been published by the Verlag Chemie, of Berlin. *Das Buch der grossen Chemiker*, Volume I (pp. 496, 24 marks bound, 21 marks unbound), is a co-operative effort, edited by Dr. Günther Bugge, and takes the form of a series of chapters in which accounts are given, by various authors, of the lives and work of the most eminent chemists covered by the period Zosimos (A.D. 350-420) to Schönbein (1799–1868). Various famous British names figure in the list, and a perusal of the sections dealing with them (which to a British reader will be a fair criterion of the value of the book as a whole) shows the erudition and impartiality of the authors. The book is excellently printed and produced ; its value is greatly enhanced by numerous portraits and illustrations printed on special paper ; and its price seems remarkably low.

* * *

Filtration and Filters, by J. A. Pickard, A.R.C.S., B.Sc., F.I.C., will be published at 32s. 6d. net in October, by Ernest Benn, Ltd. This fully illustrated book deals with the whole field of filtration and filters, and surveys every type of plant and process in use in various industries.

The Chemical Utilisation of Coke Oven Gas

An Account of German Practice

One of the most important uses of the large quantity of coke oven gas being produced in Germany at the present time is the production from it of large quantities of hydrogen for ammonia synthesis. Coke oven gas contains hydrogen approximating in quantity to about half its volume, and it is separated from the associated gases—methane, ethylene, ethane, and if necessary, the nitrogen—by the use of very low temperatures, as described below.

Method of Separation

In the process used, the coke oven gases, after the recovery of the tar, ammonia, and benzol contents in the usual way, are treated for the removal of carbon dioxide and hydrogen sulphide, compressed to 10 to 30 atmospheres, and then subjected to cooling to a very low temperature by means of liquid nitrogren. The apparatus and method used are those of the Lindes Eismachinen A.-G. The long experience of the Linde firm has enabled them to develop a method whereby the separation of a cubic metre of hydrogen from 2 to 2·2 cubic metres of coke oven gas requires a power expenditure of scarcely 0·5 horse-power, which includes the production of the liquid nitrogen used as cooling medium from the atmosphere. The remaining costs in this process are very small. Besides the hydrogen, the other most important constituents of the coke oven gas, such as methane, ethylene, and ethane or other hydrocarbons, are obtained in liquid form.

The important point is to prevent the separation of easily condensible and easily solidified constitutents during the liquefaction. The separating apparatus, even for a large throughput, is essentially nests of small diameter tubes for the purpose of ready transmission of cold, and quite tiny percentages of the above constituents, scarcely enough to be found in analysis, are sufficient to block the tubes and to prevent continuous operation. An example may help to illustrate this fact: washed coke-oven gas may still contain say, one thousandth of one per cent. of acetylene or other easily condensible gas. The usual apparatus unit has a capacity for handling 5,000 cubic metres of gas hourly, or 120,000 cubic metres in 24 hours. With this throughput of coke oven gas, 0·001 per cent. of acetylene would amount in 24 hours to 1·2 cubic metres, or about 1·5 kg. in weight, quite sufficient to cause a stoppage of the gas passage through the tubes. This necessitates a "thawing" of the apparatus, with consequent interruption of continuity, etc.

Properties of Constituents of Gas

The fact that such difficulties are not experienced even with a complicated gas mixture such as coke oven gas is due to two kinds of phenomena: In the following table the most important constituents of the purified coke oven gases are shown in their quantity relations, their liquefying points, and their freezing points. The liquefying temperatures are given for the pure gas at atmospheric pressure:

Gas.	Percentage in Coke Oven Gas.	Liquefaction temperature.	Freezing temperature.
H	50	−252·6	−259·1
N	13·5	−196·0	−209·8
CO	7·5	−189·1	−207·0
Oxygen	0·8	−182·9	−248·6
CH_4	25·0	−161·5	−184·0
C_2H_4	1·0	−103·5	−169·4
C_2H_6	0·5	− 89·2	−172·1
C_2H_2	0·3	− 83·9	− 81·8
C_6H_6	1·0	− 47·7	—
C_3H_8	0·5	− 44·0	−189·9
C_4H_{10}		− 0·6	−135·0

It is seen from this table that the liquefaction temperatures of the individual hydrocarbons are spread over a temperature range from −0·6° to −252·6°, but the freezing points show no such wide differences Seeing that the freezing points are chiefly low, the liquefaction of the hydrocarbons can take place without any separation of solid. Notwithstanding the very low temperatures which prevail, the liquid gases have a certain, if limited, mutual solubility, so that those hydrocarbons which, if alone, would become solid at a given temperature become dissolved in the liquid of the lower-boiling hydrocarbons. Thanks to this circumstance, an individual unit apparatus can generally be kept in operation continuously for three weeks, during which time 2·5 million cubic feet of gas can pass through it. As the working week with such apparatus is about three times as long as the usual working week, an apparatus works for about 325 days a year, and in that time is charged with about 39 million cubic metres of gas. The hydrogen-nitrogen gas mixture obtained from this quantity is about 7½ million kg., equivalent to 7,500 tons of liquid ammonia, or 30,000 tons of ammonium sulphate.

The Bronn-Concordia Method

The process described in the patent of J. Bronn and Concordia Bergbau A.-G. has been operated by the Concordia concern with a Linde apparatus since 1921. In this plant, which has several times been enlarged in the meantime, the individual gases, namely, hydrogen, methane (pure, and mixed with ethylene, etc.), nitrogen and oxygen are obtained and sold in highly compressed form in steel cylinders.

The well-known Belgian firm of Semet, Solvay and Piette (now part of the Union Chimique Belge) took over this process in 1924 and introduced it in their ammonia synthesis works. The original plant was designed to deal with 5,000 cubic metres of gas hourly; its capacity has since been trebled and it is intended to enlarge it still further.

In Germany, the process was developed on a large scale by Herr Battig in connection with the ammonia synthesis at Mont Cenis, and the capacity of the plant at this place is about 20,000 cubic metres of gas hourly. This process was adopted after comparison with small plants and the Messerschmidt hydrogen process (steam in contact with red-hot iron ore), the considerable superiority of the separation of coke oven gas by low temperatures having been established. A second plant of this kind has been adopted by the Gasverarbeitungs-Gesellschaft directed by Herr Battig. This plant was erected by the Hibernia concern.

A plant of about the same capacity has been installed at Holten for the Ruhr-Chemie A.-G., and another plant in Rauxel, considered to be designed according to the Bronn-Concordia patent, is being erected. While all these plants have been installed for the purpose of obtaining hydrogen for ammonia synthesis, a plant at Meiderich is being used for the production of hydrogen for the liquefaction of coal by the Bergius process. To refer to the plants erected in foreign countries—France, Belgium and Holland—would unduly prolong this list.

A Belgian Estimate

The Union Chimique Belge, referred to earlier, which has had the longest experience of the process of all users, made known its experience through its chief chemist (M. Pallemaerts) at the Second Bituminous Coal Conference held at Pittsburgh. The opinion is expressed by M. Pallemaerts that the hydrogen obtained in this way costs only 38 per cent., or little more than one-third, of that obtained from water-gas.

Although this method of hydrogen production is established as advantageous wherever coke oven gas is available, the process of utilising the coke oven gas is by no means complete with this application, and it offers many kinds of problems for chemical research, the solution of which would be of very great economic importance. In the first place, a suitable means of employing the methane, ethylene, and other hydrocarbon constituents of the gas is needed. These gases become available in great quantities, and are completely freed from sulphur compounds. Their use hitherto has been merely for heating purposes, which is a waste of their otherwise valuable properties. Endeavours to make a more rational use of them have gone in several directions.

It has been suggested that by cracking these gases at a sufficient temperature, additional quantities of hydrogen could be won from coke oven gas. Another method of utilising them has recently been proposed by Dr. Fischer, by which, with the aid of catalysts, a motor fuel containing a large percentage of benzol can be obtained.

Methane as such might be utilised for motor fuel. It is especially suited for the operation of heavy automobiles such as omnibuses, mail wagons, and motor lorries. Even without any change of the motor, numerous experiments have proved

that a cubic metre of methane corresponds in motor operation to a kilo of petrol. The great importance of such a use of the gas is seen from the circumstance that in Germany alone, the existing gas separation plants deliver more than 100 million cubic metres of methane yearly, which corresponds to about 100,000 tons of petrol, or about one-sixth of the present imports into Germany of petrol.

The above article is translated from one appearing in *Technische Blatter* (No. 6, 1929, pp. 78–79), written by J. Bronn, who is co-patentee of the process described above.

Chemical and Wood Industries

Statutory Meeting

THE statutory meeting of Chemical and Wood Industries, Ltd., was held in London on Friday, August 2. Lord Bledisloe, chairman of the company, presided.

Lord Bledisloe said that on the recommendation of their technical adviser, Dr. Ormandy, they had appointed an excellent general manager, Dr. Underwood, in Yugoslavia, in whom the directors had every confidence. He had already taken active steps to reorganise the wood distillation works at Teslic, and achieved considerable economies in administration. The output of the factory had been increased, and it was now working at full capacity.

The directors had decided to send out Sir Hesketh Bell on a special mission to Yugoslavia for the purpose of organising and advising on the various interests of the company in Yugoslavia and the development of its future resources.

Artificial Silk

Owing to the present depressed condition of the artificial silk trade, the directors had deemed it inadvisable to take steps, at present, with regard to the erection of the artificial silk factory mentioned in the prospectus. They were, however, keeping the whole of that situation carefully under review.

The Yugoslavian Government was directly interested in the prosperity of the company's chemical works at Teslic, and their relations with the Government were of a cordial character. Yugoslavia was a country of great potentialities, and they had the advantage of being a pioneer in the field of industry.

Sir James Calder's Visit

Sir James Calder said that he went out to Yugoslavia with Dr. Ormandy, their technical adviser, soon after the company was floated. He did not set himself up as a technical expert in regard to the industry of distillation of wood, but he had a certain amount of knowledge in regard to it. The factory was built by the H.I.A.G., which was the greatest expert authority on wood distillation in the world. It was a modern works, well built and well organised for cheap production. The timber supplies were ample, of good quality and at a very reasonable price. Some reorganisation was necessary in regard to some of the contracts, which were all done by piecework. In regard to felling and transportation, the railways which brought down the timber both for the sawmill and the chemical factory were, in his opinion, too extravagantly made. So far as this company was concerned, that was all to the good, but in future the railways would probably have to be made a little more cheaply. The organisation was fairly good, but he thought it would require strengthening, particularly on the commercial side, and steps were being taken by the directors in this connection. The supplies of timber were adequate for a great many years.

Canadian Wood Distillates and Extracts Industry

ACCORDING to figures just published by the Dominion Bureau of Statistics at Ottawa, the production in 1928 of wood distillates and wood extracts reached a total value of $1,645,009, or 4 per cent. in excess of the 1927 total. The group of seven establishments includes four distillation plants in Ontario and one distillery, one refinery and one turpentine works in Quebec. Capital employed by these plants in 1928 was reported at $1,884,935; the average number of employees was 217; salaries and wages totalled $244,438; material cost $826,477 at the works and the value added by manufacturing was $818,532. Charcoal, methyl alcohol, acetate of lime, acetic acid, formaldehyde, wood creosote and turpentine were among the products of this industry.

Death of Auer von Welsbach

THE death took place on Monday, at his residence at Welsbach Castle, Carinthia, of Baron Karl Auer von Welsbach, discoverer of the elements neodymium and praseodymium, and inventor of the incandescent gas mantle, the Auer gas lamp, and the osmium lamp.

Auer von Welsbach was born in Vienna in 1858. At the age of 20 he went to Heidelberg, where he worked under Bunsen, concentrating his researches on the chemistry of the rare earths. The discovery of the two elements mentioned above was made in 1885. While he was experimenting with the Bunsen burner, the idea of the incandescent light came to him, but it was not until some years afterwards that he was able to bring his mantle to perfection, to revolutionise the gas industry, and to make a fortune for himself.

Gas Mantles

In the course of his researches on the rare earths, Welsbach had been desirous of obtaining a better effect than that produced by heating his material on a platinum wire, and to this end he immersed cotton in a solution of the metallic salt. He found that, after burning off the organic matter, a replica of the original thread, composed of the oxide of the metal, remained, and that it glowed brightly in the flame. The idea came to him of using a fabric of cotton soaked in a solution of a metallic salt for lighting purposes, and in 1885 he patented his first commercial mantle. The oxides used were lanthana, yttria, and zirconia; but they were so fragile as to be practically useless, while the light they gave was very poor.

In subsequent experiments Welsbach found that thorium oxide, in conjunction with other rare earths, increased the lighting power of the mantle. Later it was found that the purity of the oxides had a remarkable effect on the amount of light, and finally came the discovery that a small quantity of ceria mixed with the thoria gave the mantle a very high power of emitting light. This led to the development of the incandescent mantle industry, and in the year before the war Germany alone was consuming nearly 50,000,000 of them.

The Osmium Lamp

Great efforts had been made to find a material for the filament of an incandescent lamp which would replace carbon and not require a preliminary heating. Welsbach suggested osmium. In 1897 he brought out the osmium filament lamp, and six years later the ferro-cerium compound used in making modern pocket lighters. To the end he was active and scientifically alert.

Faraday Electromagnetic Centenary

THE arrangements initiated by the Royal Institution of London for the celebration of the centenary of Faraday's discovery of electromagnetic induction have already been announced. At the representative meeting held at the House of the Institution on February 5, 1929, the formation of two committees was agreed to, and these committees are now at work. The first, consisting of representatives of the Royal Society, the British Association, and other scientific societies, as well as the Royal Institution, is concerned with the purely scientific aspects of Faraday's work in relation to the proposed celebrations; the second committee, which has been called together by the Institution of Electrical Engineers, consists of representatives of the principal organisations of those industries which have risen in the past hundred years upon the scientific foundation of Faraday's discoveries, and is dealing with the industrial aspects of the celebrations. The two committees are working in close co-operation; the preliminary discussions which have taken place indicate that the significance of the centenary is very widely appreciated and that the celebrations are likely to arouse world-wide interest and support. The dates have now been fixed, and the proceedings will commence in London on Monday, September 21, 1931. Further, an intimation has been received from the British Association that its centenary meeting will be held in London during the week commencing September 23, 1931. These two centenaries, with important electrical conferences and other events which are to take place about the same time, will thus conjoin to make the year 1931 a memorable one in this and every country where the genius of Faraday has borne fruit.

D

Developments in Steam Generation

High Pressure Boiler Plant for Billingham

At the North-East Coast Exhibition, Newcastle, one of the most interesting displays in the Hall of Engineering is that of International Combustion, Ltd., and their associated companies, particularly as showing by means of detailed scale models the latest developments in steam generation practice. Thus, for example, there is a model of the new "Lopulco" forged steel drum boiler plant now being constructed for Synthetic Ammonia and Nitrates, Ltd., Billingham-on-Tees, which will cost about £800,000. These boilers, eight in number, are to operate at 800 lb. of water per hour, constituting the largest super-pressure industrial boiler plant in the world, having a total throughput of over 2,000,000 lb. of steam per hour, fired by "Lopulco" pulverised fuel on the latest principles.

A model of the "R" turbulent burner is also shown, whereby combustion results in a flame of less than 10 ft. in length with a consumption up to six tons of coal per burner per hour, and not over 2 in. W.G. pressure in the air supply. Consequently the design of the combustion chamber for pulverised fuel firing has been revolutionised, since only a few burners are required for even the largest setting, which also can now be placed at the front of the setting, operating in a horizontal direction instead of downwards. Consequently the overall height of the combustion chamber is much reduced, while the arrangement also includes three walls of "Murray-Usco" steel tube water-cooled walls, air heaters, and part of the hot air passed through the "Raymond" pulverisers. Also all the air, both primary and secondary, now goes through the burner itself, whilst if pre-drying of the coal is necessary under these circumstances the "Rosencrantz" vertical, steam heated, mechanically continuous rabble arm dryer is now employed.

With regard to air-heaters, it may be stated, also as shown by a model, that the "Usco" multiple plate heater has now been re-designed to allow of a cheaper method of construction, but retaining the method of electric welding of joints throughout so as to eliminate leakage of air and gas.

Further, there is on view a model of the new "Underfeed Type L" Stoker with swinging louvre links, operating with "Detrick Usco" suspended arches to any width, whilst at the same time giving uniform air distribution under accurate control to every part of the grate surface, transversely and longitudinally, and eliminating all riddlings ejector mechanism, since the links all carry away their own riddlings.

Suggested Revival of Kelp Industry

Two experts, representing important French interests, have just concluded an examination of some parts of the Hebridean coast, their object being to arrive at a decision as to the prospects, if any, of a successful revival of the kelp industry in the Western Isles. About 70 years ago, the manufacture of kelp from seaweed was an important industry in the Hebrides, and the French experts state that, as the exact type of seaweed needed grows in great abundance on rocks adjacent to the coast of the Isles, the industry, if carried on on scientific principles, would undoubtedly succeed. In the old days, the kelpers of the Hebrides cut the seaweed off the rocks and towed it to the shore, but for years back the workers used weed which had been torn by wave and current off the rocks. According to the experts, the seaweed should always be cut off the rocks to secure the best results, and rock surfaces at various points of the coast were examined to enable an opinion to be formed as to whether a weed-cutting machine used by kelpers in France could be utilised.

Appointments Vacant

Plant Chemist for manufacture of cellulose acetate. Details on p. xxxii.

Chemist or Engineer or Chemical Engineer with experience in the manufacture of silk by the dry (so-called acetate) process. Details on p. xxxii.

Chemical Works Foreman experienced in organic processes. Details on p. xxxii.

Engineer with experience in the erection and operation of cellulose acetate plant. Details on p. xxxii.

New Benn Publications

The new publications announced by Ernest Benn, Ltd., include the following:—

The Complete Works of Percy Bysshe Shelley. Edited by Roger Ingpen and Walter E. Peck. 63s. This superb *édition definitif* is now nearly complete. It is universally admitted to be unrivalled in its scholarship and rare beauty of form. For sale only in sets.

The Ainceworth Mystery. By Gregory Baxter. 7s. 6d. Second impression.

Modern Papermaking. By R. H. Clapperton and W. H. Henderson. Illustrated. 31s. 6d. Second impression.

A History of England. By D. C. Somervell. Benn's Sixpenny Library. Reprint.

Heredity. By Dr. F. A. E. Crewe. Benn's Sixpenny Library. Reprint.

The Mind and Its Workings. By C. E. M. Joad. Benn's Sixpenny Library. Reprint.

The Theory of Music. By the Rev. Greville Cook. Benn's Sixpenny Library. Reprint.

The Story of the Amulet. By E. Nesbit, with illustrations by H. R. Millar. 3s. 6d.

Wet Magic. By E. Nesbit. 3s. 6d.

Meanwhile. By H. G. Wells. 3s. 6d. First cheap edition.

Madame Claire. By Susan Ertz. 3s. 6d. First cheap edition.

A Lot of Talk. By Helen Ashton. 3s. 6d. First cheap edition.

Golden Rain. By Owen Rutter. 3s. 6d. First cheap edition.

Western Viscose Silk Mills

At the statutory meeting of the creditors in the voluntary winding up of this company, the liquidator, Mr. C. H. Nelson, reported that the ranking liabilities were £20,615 5s. 10d., all of which were due to the trade. According to the books, the assets totalled £363,696 15s. 2d., and they were estimated to realise £169,777 7s. 3d. From the latter figure had to be deducted £2,074 11s. in respect of preferential claims, and £105,324 13s. 4d., due on debentures. The net assets, therefore, were £62,378 2s. 11d., or a surplus, so far as the creditors were concerned, of £41,762 17s. 1d. The assets comprised cash in hand, £29 13s. 3d.; stock, £11,997 17s. 5d., estimated to realise £7,998 11s. 8d.; book debts, £5,314 11s. 4d., expected to produce £4,783 2s. 4d.; freehold land, £12,000, valued at £10,000; mill buildings, £123,775 6s. 4d., estimated to realise £61,882; dwelling houses, £2,869 2s. 9d., expected to produce £2,000; and plant and machinery, £207,710 4s. 1d., valued at £83,084. The liquidator reported that a receiver had been appointed for the debenture holders and he was negotiating for the sale of the business. The creditors passed a resolution confirming the voluntary liquidation of the company with Mr. Nelson as liquidator, and an advisory committee was appointed consisting of the representatives of Imperial Chemical Industries, Ltd., E. Bourne and Co., Ltd., Karl Zevis (London), Ltd., Burgess, Ledward and Co., Ltd., and Sheldon, Bush and Co.

Industrial Effluents and Common Sewers

The report of the special pollution sub-committee on the Right of Entry of Industrial Effluents into Public Sewers has now been sent out to the trade associations who have effluent problems, and to all district committees of the F.B.I., for their consideration. The report recommends: (*a*) that industrial effluents should have the right of entry into common sewers; (*b*) that all existing rights regarding effluent disposal and water intakes should not be interfered with by any new legislation; and (*c*) that terms and conditions of entry of effluents into sewers should be subject to an appeal to a joint committee of traders and public health authorities where agreement cannot be reached voluntarily. It is hoped that the replies of the associations will be received early in the autumn so that the evidence may be put before the national advisory committee who are at present taking evidence from local authorities, river boards, etc., on this subject.

From Week to Week

THE DU PONT DE NEMOURS COMPANY has acquired a holding of shares in the company l'Air Liquide, of France.

EXPORTS OF TUNG OIL from Hongkong in 1928 amounted to 11,985,000 lb., as compared with 10,681,000 lb. in 1927.

THE ITALIAN GOVERNMENT-has acquired land at Tjibitch, Java, for the establishment of plantations for the production of quinine. A sum of 6·5 million lire will be spent on the plan.

TARMAC, LTD., announce that Mr. Edward Hickman has resigned the chairmanship owing to ill-health, but retains his seat on the board. The directors have unanimously elected Mr. Charles Edward Hickman as chairman.

AUSTRALIAN BENZOL AND COAL DISTILLATION, LTD., is being registered in New South Wales with a capital of £300,000 to acquire a colliery and erect a carbonisation plant according to specifications prepared by the Illingworth Carbonization Co., England.

IN THE INTERNATIONAL COMPETITION organised by the National Association of Olive Growers of Spain, for a treatise on the differentiation of pure and impure olive oil, prizes have been won by Mr. T. G. Joyce (2,000 pesetas, £80) and Mr. W. Rhys-Davies (700 pesetas, £28).

THE COMMONWEALTH ENGINEERING STANDARDS ASSOCIATION of Sydney recently published two new tentative Australian standard specifications and methods of sampling and testing for zinc oxide, dry, and zinc oxide in oil, and ready mixed linseed oil paint, consisting of red oxide of iron.

WOMEN EMPLOYEES who terminate their service with the South Metropolitan Gas Co. to get married will in future receive a substantial marriage dowry from the co-partnership committee. The company's regulations require women to leave its service upon marriage. The scheme applies to all grades of female workers.

THE BRITISH COLUMBIA CHEMICAL CO., LTD., is shortly to commence the large-scale mining of soda ash from deposits near Clinton, B.C. A plant to cost about $50,000 is being installed at Last Chance Lake, near Beaver Dam, about twenty miles north of Clinton, for the mining of soda from the bottom of the lake.

THE POLISH PRODUCTION of ammonium sulphate has been increasing rapidly in recent years, from 22,989 metric tons in 1927 to 36,927 metric tons in 1928. This quantity is more than sufficient to supply the domestic demand, and gives a considerable surplus for export. Imports of ammonium sulphate, which in 1927 amounted to 3,104 metric tons, declined to 1,199 tons in 1928. Exports, on the other hand, rose from 11,519 tons in 1927 to 18,272 tons in 1928.

THE WORLD OUTPUT of artificial silk in 1928, according to German calculations, was 347,400,000 lb., as compared with 266,868,000 lb. in 1927. Individual productions by the various countries of the world in 1928 and 1927 (the latter, in brackets) were as follows, in pounds weight:—United States, 98,650,000 (75,050,000); Great Britain, 52,000,000 (38,803,000); Italy, 45,000,000 (36,000,000); Germany, 41,000,000 (31,000,000); France, 30,000,000 (21,000,000); Holland, 16,500,000 (unchanged); Belgium, 15,000,000 (13,500,000); Switzerland, 12,000,000 (10,340,000); Japan, 12,000,000 (8,000,000); Poland, 7,500,000 (4,000,000).

THE RIVER WEAR is the subject of a report issued by the Ministry of Agriculture and Fisheries. It is stated in the report that the presence of tar acids to the extent of 2·5, 1·2 and 0·11 parts per 100,000, respectively, must be regarded as a bad feature of the survey. In general, it may be assumed that 2 parts in a million has an adverse effect upon aquatic animals. The importance of preventing the entry of even very small quantities of lead into a river may be gauged from the fact that minute doses of one part of lead to three million parts of water are lethal to sticklebacks and trout, while plant life is similarly affected.

THE AMERICAN CYANAMID CO. is to absorb the Kalbfleich Corporation. The former, in addition to its recent absorption of the Calco Chemical Co., is interested also in the following undertakings: Air Nitrate Corporation (100 per cent. of capital); Fumigadores Quimicos S. A., with a factory in Valencia, Spain; American Cyanamid Sales Co. Inc. of Delaware; Fumigators Supplies, Ltd.; Cyanamid Products Co.; Dominion Zinc Co., Ltd., Quebec; Stirling Zinc Ltd. (Canada) and Ferto Chemical Sales Co., Ltd. The Kalbfleich Corporation is one of the oldest undertakings in the American chemical industry, having been founded in 1829.

JAPAN is able to produce sufficient nitric acid to meet all her needs, and has a surplus for export. The ammonia oxidation process is the only method used, and the bulk of the present production is from two companies. The production during recent years was as follows:—1925, 15,929,936 pounds; 1926, 17,226,370 pounds; 1927, 14,226,606 pounds; 1928, 15,000,000 pounds. Manufacturers are not producing to their full capacity and many other factories besides the two at present concentrating on this product could manufacture if necessary. Estimates of potential production are not obtainable. Exports of nitric acid by Japan for the past three years were as follows:—1926, 3,413,500 kin; 1927, 4,310,400 kin; 1928, 4,351,500 kin (1 kin=1·32 pounds).

I.C.I. (states a German report) is interested in the marketing of the potassium salts produced at Cardona, Spain. The company is also said to be negotiating with the Union Espaniol d'Explosive.

RECENT WILLS INCLUDE: Mr. Julius George Ohlenschlager, of Ashurst, Fernhurst, Sussex, and of Shanghai House, Botolph Lane, London, import and export merchant, £324,726 (net personalty £276,242).

THE PRODUCTION OF CADMIUM at the works of the Electrolytic Zinc Co., at Risdon, Australia, is to be doubled. In the twelve months ended June 30, 1928, 162 tons (12 tons more than in the previous twelve months) were produced.

IN AMERICAN CHEMICAL CIRCLES it is believed that the proposed erection of a nitrogen products plant in Trail, British Columbia, by the Consolidated Mining and Smelting Co. of Canada is connected with the recent agreement arrived at between I.C.I., the I.G., and the Chilean nitrate producers.

A CONSIDERABLE DEMAND exists in Sao Paulo for hydrogen peroxide of 30 per cent. strength or higher. Besides its use for medicinal purposes there is a good market in the industries, of which the cotton and other textiles are the leading ones of Sao Paulo. Import duties are levied on weight only.

TERPIN HYDRATE is being applied to the treatment of respiratory diseases. France, which produced little terpin oil before the war, now exports the excess of its production. One of the by-products, terpinolene, is being used in the treatment of tuberculosis. The French production of terpinolene amounts to 150 tons per annum, about 50 tons being exported.

THE HIGH COMMISSIONER OF CANADA in London has received, from the Mines Branch of the Dominion Department of Mines at Ottawa, a revised edition of List No. 3–4, "Graphite Mines in Canada," copies of which will be obtainable shortly on application to the Office of the High Commissioner of Canada, The Canadian Building, Trafalgar Square, London, S.W.1.

BAYERISCHE STICKSTOFFWERKE AKTIENGESELLSCHAFT, operating at Trostberg (Bavaria), and Mitteldeutsche Stickstoffwerke Aktiengesellschaft, operating at Piesteritz, and leased to the Bayerische company, have issued annual statements reporting a favourable business in calcium cyanamide. Both companies announced a 1928 dividend of 8 per cent. Estimates are that these two cyanamide plants are producing about 80,000 metric tons of fixed nitrogen annually in cyanamide, Bayerische producing about 50,000 tons and Mitteldeutsche about 30,000 tons. The latter has leased one-half of its factory space at Piesteritz to the I.G. Farbenindustrie for its electrolytic manufacture of the complete fertiliser, Nitrophoska.

THE EUCALYPTUS OIL INDUSTRY is of much importance in Australia, and many people find employment in its production and distribution. Complete information regarding Australian production and consumption of eucalyptus oil is not available. Overseas exports amounted in 1925–26 to £73,023 and in 1926–27 to £63,284. The bulk of the product was shipped to Great Britain, the United States, and Germany. Important research work is now being undertaken by the Sydney Technological Museum in conjunction with the Council for Scientific and Industrial Research concerning the development of possible commercial methods of using phellandrene, which occurs in most varieties of eucalyptus oils.

THE CHIEF INSPECTOR of Alkali Works, in his annual report for the past year, refers to the retirement of Mr. Ernest Linder, B.Sc., from the position of Chief Inspector's assistant, after serving under four chief inspectors for 35 years. Mr. Linder's work, the report states, "has always been characterised by thoroughness; he devoted himself with untiring energy to whatever subject for research came to hand. He has practically identified himself with the analysis and constitution of coke oven and gasworks liquors, many of the analytical methods, now employed as standard methods, being due to him. During the past seven years he has done excellent work on ammonia plant effluents and likewise in connection with sulphuric acid manufacture and other industries." Mr. Linder has been succeeded by Dr. J. S. Carter.

DESPITE SYNTHETIC METHANOL COMPETITION, satisfactory business in 1928 is reported by the Verein fur Chemische Industrie, Frankfort-on-Main, which with the Holzverkohlungsindustrie Aktiengesellschaft, Constance, controls the domestic German wood distillation output. The Verein is in process of intensive rationalisation, and is putting its works on a more efficient basis. It closed down a distillation unit at Neheim-Hueston, Westphalia, in 1928 and has centred production in seven of its remaining plants. The Verein restored in 1928 its contract with N. V. Algemeene Norit Maatchapij, Amsterdam, on activated carbon after the adjustment of differences which had developed during the earlier part of the year. The Verein operates two activated carbon plants: The Chemische Werke Carbon G.m.b.H., in Ratibor, Upper Silesia, which has increased its output, and Chemische Fabrik Jueterbog, G.m.b.H.

Obituary

AUER VON WELSBACH, on Monday, August 5. An obituary notice appears on another page.

References to Current Literature

British

ANALYSIS.—The determination of manganese by the Volhard method. F. J. Watson. *Chem. Eng. and Mining Review* (Australia), June 5, pp. 352–353.

The determination of total and available lime. N. Shilkin. *Chem. Eng. and Mining Review* (Australia), June 5, pp. 354–355.

A new method for the determination of the melting point of resins. T. H. Durrans. *Journ. Oil and Colour Chem. Assoc.*, June, pp. 173–175.

Cobalt determination in driers, japan, alloys, etc. O. Heim. *Journ. Oil and Colour Chem. Assoc.*, June, pp. 175–176.

The analysis of union materials. L. L. Lloyd and E. Priestley. *Journ. Soc. Dyers and Col.*, July, pp. 201–204.

DYE FASTNESS.—The Fastness Tests Committee: Interim report on standardisation of methods of testing the fastness of dyed and printed materials. F. Scholefield.—Preliminary report on investigations of the fastness of dyed textiles to light and washing. P. W. Cunliffe.—Preliminary report on investigations on perspiration with special reference to the bleeding of dyes. C. N. Vass. *Journ. Soc. Dyers and Col.*, July, pp. 214–215, 215–217, 217–219.

TEXTILES.—Notes on the effect of light on coloured fabric. III.—E. Hibbert. *Journ. Soc. Dyers and Col.*, July, pp. 204–205.

The singeing of cotton and the formation of oxycellulose. G. E. Holden. *Journ. Soc. Dyers and Col.*, July, pp. 205–206.

WOOL.—The sulphur content of wool. II.—Distribution of sulphur along the fibre, variation with colour, and the effect of exposure to ultra-violet light. J. Barritt and A. T. King. *Journ. Textile Inst.*, July, pp. T151–158.

The sulphur content of wool. III.—Effects of chemical processing on sulphur content. J. Barritt and A. T. King. *Journ. Textile Inst.*, July, pp. T159–161.

United States

ADSORPTION.—The adsorption of certain acids by wool. W. W. Paddon. *Journ. Phys. Chem.*, July, pp. 1107–1108.

ANALYSIS, OIL.—Volumetric estimation of sulphur in crude petroleum. G. Woodward. *Ind. Eng. Chem., Analytical Edition*, July 15, pp. 117–118.

Determination of sulphur in petroleum oils. R. C. Griffin. *Ind. Eng. Chem., Analytical Edition*, July 15, 167–169.

APPARATUS.—Simplified iodine pentoxide apparatus for determination of carbon monoxide in flue gas. F. E. Vandaveer and R. C. Gregg. *Ind. Eng. Chem., Analytical Edition*, July 15, pp. 129–133.

A large metal Soxhlet extractor. L. R. Bryant. *Ind. Eng. Chem., Analytical Edition*, July 15, pp. 139–140.

Modification of the Kjeldahl trap. G. H. W. Lucas. *Ind. Eng. Chem., Analytical Edition*, July 15, p. 140.

Large-capacity laboratory condensers. D. F. Othmer. *Ind. Eng. Chem., Analytical Edition*, July 15, p. 153.

An improved air-gas ratio apparatus. C. Z. Rosecrans. *Ind. Eng. Chem., Analytical Edition*, July 15, pp. 156–158.

A new plastometer. E. Karrer. *Ind. Eng. Chem., Analytical Edition*, July 15, pp. 158–160.

An improved volumenometer. A. W. Francis and A. P. Oxnard. *Ind. Eng. Chem., Analytical Edition*, July 15, pp. 169–170.

GENERAL.—Viscous liquids mixed and dried in 80 per cent. less time. R. D. Jessup. *Chem. and Met. Eng.*, July, pp. 413–414.

The solubility of phosphates of calcium in aqueous solutions of sulphur dioxide. W. M. Mebane, J. T. Dobbins and F. K. Cameron. *Journ. Phys. Chem.*, July, pp. 961–969. It is stated that as a plant method the production of calcium phosphate by the treatment of phosphate rock with sulphur dioxide is impracticable, for experimental reasons given.

Ethyl abietate. A. C. Johnson. *Ind. Eng. Chem.*, July, pp. 688–689. This substance is a resin which is not only soluble in nitrocellulose solvents but is in itself a latent nitrocellulose solvent.

Moulds and chemical manufacture. H. T. Herrick and O. E. May. *Ind. Eng. Chem.*, July, pp. 618–621.

Triethanolamine oleate for oil sprays. G. L. Hockenyos. *Ind. Eng. Chem.*, July, pp. 647–648. An account of the use of the substance in oil emulsions for insect control.

ORGANIC.—The cresyl esters of phenylacetic acid. L. C. Raiford and J. G. Hildebrand, Jr. *Amer. Journ. Pharmacy*, July, pp. 481–484.

Chaulmoogryl aminophenols and chaulmoogryl benzylamine. Irene de Santos and A. P. West. *Philippine Journ. Science*, April, pp. 445–449. The following are described:—Chaulmoogryl *o*-, *m*-, and p-aminophenol, and chaulmoogryl benzylamine.

SULPHURIC ACID.—Comparison of modern chamber sulphuric acid plants. T. R. Harney. *Chem. and Met. Eng.*, July, pp. 402–406.

German

ANALYSIS.—The determination of potassium, sodium, chlorine and phosphorus in small quantities in organic substances. E. Ernst and J. Barasits. *Biochemische Zeitschrift*, Vol. 209, Parts 4–6, pp. 438–446.

The qualitative detection of fats and their components, with special reference to micro-methods. A. Niethammer. *Biochemische Zeitschrift*, Vol. 209, Parts 4–6, pp. 447–457.

APPARATUS.—An improvement in thermostats with electrical heating. L. Hock and C. L. Nottebohm. *Zeitschrift Elektrochem.*, July, p. 458.

A new automatic apparatus for the determination of water by means of distillation. J. Pritzker and R. Jungkunz. *Chemiker-Zeitung*, August 3, p. 603.

The Bloom gelometer, a new instrument for the testing of glue and gelatin jellies. H. Mendel. *Chemiker-Zeitung*, July 31, pp. 591–592.

GENERAL.—The development of cellulose saccharification and the production of wood spirit. H. Bausch. *Zeitschrift angewandte Chem.*, July 27, pp. 790–791.

OILS.—A consistent theory of the drying process and the heat-polymerisation of fatty oils. B. Scheifele. *Zeitschrift angewandte Chem.*, July 27, pp. 787–790.

Miscellaneous

GENERAL.—The electrolytic preparation of potassium permanganate. J. Roudnick. *Bulletin Société Chim. Belgique*, May, pp. 147–159 (in French).

Observations on the properties of some very dry organic substances. J. Timmermans. *Bulletin Société Chim. Belgique*, May, pp. 160–162 (in French).

Bentonite: Its occurrence, extraction, properties and uses. J. H. Frydlender. *Revue Produits Chimiques*, May 31, pp. 325–328; June 15, pp. 357–362 (in French).

ORGANIC.—Investigations on alpha-chloronaphthalene. IV. The chlorination of naphthalene in the dissolved phase. P. Ferrero and M. Fehlmann. *Helvetica Chimica Acta*, Vol. XII, Part 4, pp. 583–603 (in French).

Orthoaminobenzene sulphonic acid (orthanilic acid). H. E. Fierz with E. Schlittler and H. Waldmann. *Helvetica Chimica Acta*, Vol. XII, Part 4, pp. 663–668 (in German).

The electrochemical reduction of benzoic acid. F. Fichter and I. Stern. *Helvetica Chimica Acta*, Vol. XII, Part 4, pp. 821–826 (in German).

A study of aromatic sulphamides. J. and P. Koetschet. *Helvetica Chimica Acta*, Vol. XII, Part 4, pp. 669–699 (in French).

Investigations on the ozonisation of unsaturated gaseous hydrocarbons. IV.—The ozonisation of acetylene. E. Briner and R. Wunenberger. *Helvetica Chimica Acta*, Vol. XII, Part 4, pp. 786–790 (in French).

SULPHURIC ACID.—On the chamber process. XVIII. Total and differential heat balances of the Glover tower. M. Matsui and T. Sakamaki. *J. Soc. Chem. Ind. Japan* (supplemental binding), July, pp. 193–196B (in English).

VANILLIN.—The industrial preparation of vanillin. L. Mauge. *L'Industrie Chimique*, June, pp. 302–305; July, pp. 362–366 (in French).

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

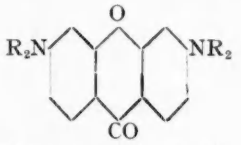
Abstracts of Complete Specifications

314,768. Azo Dyestuffs, Manufacture of. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, March 1, 1928.

Azo dyestuffs are obtained by combining the diazo compounds of the butyl esters of aminobenzoic acids or their derivatives such as halogen, nitro derivatives or aminobenzoic acids alkylated in the nucleus, with sulphonated components capable of being coupled, such as sulphonated naphthols, naphthalamines and their derivatives, pyrazolones, etc. Insoluble coloured compounds can be obtained by converting these azo dyestuffs into salts of the alkaline earth metals, aluminium, tin, etc., or into salts of strong organic bases such as cyclo-hexylamine, dicyclohexylamine, guanidine, etc. Several examples are given. Reference is directed in pursuance of Section 7, Sub-section 4, of the Patents and Designs Acts, 1907 to 1928, to Specification No. 4091/1880.

314,825. Xanthen Dyes, Process for the Manufacture of. Imperial Chemical Industries, Ltd., Imperial Chemical House, Millbank, London, S.W.1, E. H. Rodd, and H. H. Stocks, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, March 3, 1928.

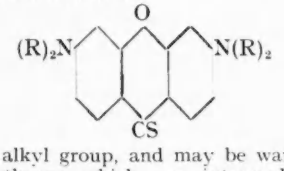
The reaction described in Specification No. 272,321 (see The Chemical Age, Vol. XVII, p. 85) is extended to xanthones of the type



where R is an alkyl group. It is now found that xanthones having this formula react with aromatic halogen compounds in the presence of an alkali metal and a solvent or diluent to form carbinols. The carbinols give salts which are dyes similar in shade to dyes of the Rhodamine series, but the carboxyl group is absent. Some dyes of this type can be made by the aldehyde method, but a large number of new dyes can be obtained by the above method. These dyes are suitable for dyeing acetate silk. The xanthones required are obtained as described in Specification No. 314,826 below.

314,826. 3 : 7-Tetra-Alkyldiamino-Xanthones, Manufacture of. Imperial Chemical Industries, Ltd., Imperial Chemical House, Millbank, London, S.W.1, E. H. Rodd, and H. H. Stocks, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, March 3, 1928.

3 : 7-Tetra-alkyl-diamino-xanthens are converted into the corresponding xanthiones by the action of sulphur. The xanthiones have the formula



where R is an alkyl group, and may be warmed with acids to obtain xanthones which are intermediates for dyes. Examples are given of the production of 3 : 7-tetramethyl-diamino-xanthione and the corresponding xanthone, and also the tetraethyl compounds.

315,078. Acid Sulphate of α-Naphthylamine, Production of. T. Warburton, 15, Humphrey Street, Cheetham Hill, Manchester. Application date, June 19, 1928.

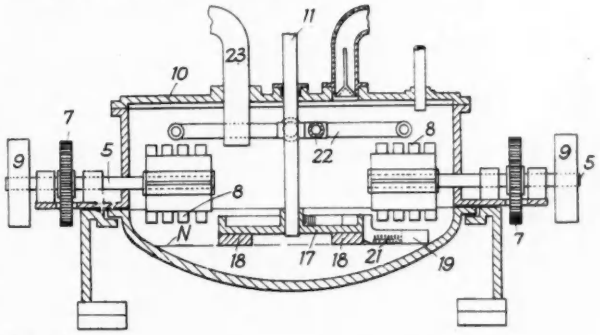
In the production of acid sulphate of α-naphthylamine by fusing it with sulphuric acid at a high temperature, some tar and other by-products are formed. In this invention, α-naphthylamine is treated with a slight excess of sulphuric acid in strength not above 100 per cent. H_2SO_4 in a mixing or grinding machine, without heat other than that generated in the reaction. The normal sulphate of α-naphthylamine is obtained in a similar manner, but with half the quantity of sulphuric acid, and the acid sulphate may be obtained from the normal sulphate by the same method.

315,033. Vat Dyestuffs, Production of. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, April 26, 1928.

Specification No. 303,184 (see The Chemical Age, Vol. XX, p. 204) describes the treatment of 2 : 2¹-dimethyl-ms-benzdianthrone or its derivatives with alkaline condensing agents to obtain allo-ms-naphthodianthrones which may be treated with acid condensing agents or oxidising agents in acid solution or under the influence of light, to obtain ms-anthra-dianthrones. It is now found that these products can also be obtained by treating allo-ms-naphtho-dianthrone or its derivatives with alkaline condensing agents, such as caustic alkalies, at a temperature of at least 230° C., and with an oxidising agent such as alkali metal nitrate or manganese dioxide. The allo-ms-naphtha dianthrones need not be prepared as such, but the ms-anthradianthrones may be obtained in one operation from 2 : 2¹-dimethyl-ms-benzdianthrones by treating with caustic alkalies. Examples are given.

315,128. Lead Oxide, Production of. G. B. Price, Normandy Wharf, Rotherhithe, London, S.E.16, and Quirk, Barton and Co., Ltd., Friars House, 39-41, New Broad Street, London, E.C.2. Application date, August 16, 1928.

Litharge is formed by the oxidation of molten lead in a pot, and is agitated and carried away by a suitable draught in the form of finely divided particles.



315,128

The melting pot 1 is provided with two pairs of rotating beaters 8 situated at opposite sides. The beaters of each pair are interconnected by gearing 7 so that they rotate in opposite directions. Each shaft 5 is driven by a pulley 9, and rotates above the normal level N of the molten lead. The cover 10 carries a shaft 11 in water-cooled bearings, the shaft being oscillated through about 90° by any convenient means. The shaft carries a circular flanged screening plate 17, which keeps the molten lead from being blown up among the litharge. Small sweeps 18 and large sweeps 19 are mounted on the plate 17, and convey the dross over the surface of the molten lead to the beaters 8, and a comb 21 is also provided to break up the litharge. Hot air and/or steam are supplied through pipes 22 and the litharge is drawn off through pipe 23.

315,142. Ballast Free Solid Fertilisers containing Lime, Manufacture of. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, September 14, 1928.

Crude calcium phosphate is treated with nitric acid, and the product treated with milk of lime to precipitate dicalcium phosphate, which is then separated. The solution containing calcium nitrate is treated with potassium sulphate, and the resulting solution of potassium and calcium nitrates is concentrated and mixed with the separated dicalcium phosphate. The mixture of salts is solidified by cooling to obtain a fer-

tiliser which contains nitrogen, phosphoric acid, potash, and lime.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: 287,135 and 294,226 (J. Karpati and M. G. Hübsch) relating to acetic acid from acetylene, see Vol. XVIII, p. 495 and Vol. XIX, p. 297; 287,908 (I.G. Farbenindustrie Akt.-Ges.), relating to azo dyestuffs, see Vol. XVIII, p. 516; 288,154 (Kali-Industrie Akt.-Ges. and C. T. Thorssell), relating to nitrogen and hydrogen, see Vol. XVIII, p. 516; 288,159 (I.G. Farbenindustrie Akt.-Ges.), relating to condensation products of the benzodiazine series, see Vol. XVIII, p. 516; 288,215 (I.G. Farbenindustrie Akt.-Ges.), relating to vat dyestuffs and intermediates, see Vol. XVIII, p. 536; 288,307 (I.G. Farbenindustrie Akt.-Ges.), relating to copper amine complex azo compounds, see Vol. XVIII, p. 555; 288,628 (Schering-Kahlbaum Akt.-Ges.), relating to hydroxy-pyridine compounds, see Vol. XVIII, p. 581; 288,972 (I.G. Farbenindustrie Akt.-Ges.), relating to aromatic N-amino-alcohol-amino-aldehydes and derivatives, see Vol. XVIII, p. 581; 288,973 (I.G. Farbenindustrie Akt.-Ges.), relating to refining chromium ores, see Vol. XIX, p. 15 (Metallurgical Section); 293,440 (Gray Processes Corporation), relating to refining of hydrocarbon distillates, see Vol. XIX, p. 219; 297,050 (Goodyear Tire and Rubber Co.), relating to synthetic rubber, see Vol. XIX, p. 497; 298,636 (Metalges. Akt.-Ges.), relating to zinc from oxidic zinc compounds, see Vol. XX, p. 15 (Metallurgical Section); 300, 271 (Kali-Chemie Akt.-Ges.), relating to working up calcined zirconium-lime products, see Vol. XX, p. 53; 300,630 (Chemieverfahren Ges.), relating to alkali sulphate, see Vol. XX, p. 82.

International Specifications not yet Accepted

313,036. LEACHING PHOSPHATE. Kunstdunger-Patent-Verwertungs Akt.-Ges., Glarus, Switzerland. (Assignees of F. G. Liljenroth, Stockholm.) International Convention date, June 5, 1928.

Raw phosphate is leached with sulphuric acid or acid solutions containing ammonium or alkali sulphates, and the calcium sulphate is first obtained as semi-hydrate by leaching at 90° C. The liquid is then cooled or diluted, and the semi-hydrate crystallises into gypsum.

313,045. TREATING AMMONIACAL SOLUTIONS. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, June 5, 1928.

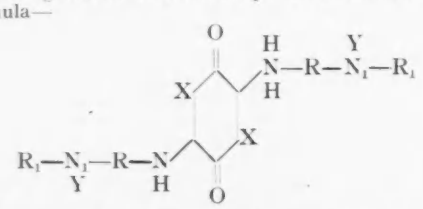
Copper hydroxide is separated from its ammoniacal solution by treating with sulphuric or hydrochloric acid in the quantity necessary to neutralise the ammonia.

313,093. CATALYTIC AGENTS. E. I. Du Pont de Nemours and Co., Wilmington, Del., U.S.A. (Assignees of W. A. Lazier and F. C. Zeisberg). International Convention date, June 6, 1928.

Hydrogenation, dehydrogenation, and synthesis of organic compounds is effected with catalysts comprising mixtures of basic and acidic oxides, the latter being in excess. Small quantities of alkali metal compounds such as sulphates, phosphates, chromates, hydroxides, carbonates, metallates, and organic salts may also be added.

313,094. DYES AND INTERMEDIATES. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, June 6, 1928.

The starting material is a benzoquinone derivative having the formula—



where X represents hydrogen or halogen, Y represents hydrogen or alkyl, and R and R_1 represent an aromatic residue, R, R_1, and N_1 possibly forming a carbazol nucleus. This compound is heated alone, or with a high boiling solvent, and the resulting oxazine sulphonated. Alternatively, sulphonated benzoquinones may be used, *e.g.*, aminodiaryl amino- or aminocarbazolsulphonic acids may be used as starting materials instead of sulphonating as the final step. A catalyst may be present such as phosphorus or antimony perchloride and/or oxidising agents such as potassium ferricyanide, pyrolusite, or ferric chloride. The products dye blue-grey-green shades, and may be treated with bases to obtain pigments for nitrocellulose lacquers.

313,095. DYES. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, July 26, 1927.

An *o*-oxydiazo compound is coupled with a pyrazolone carboxylic acid or carboxylic acid ester which can be produced by the condensation of an oxaloacetic acid ester with hydrazine. The azo dyes may be after-chromed or treated with metal compounds. In one example, 4-chloro-2-amino-1-phenol-5- or 6-sulphonic acid is diazotized and coupled with 5-pyrazolone-3-carboxylic acid.

313,123. DESTRUCTIVE HYDROGENATION. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, June 7, 1928.

Tar, crude oil, etc., is subjected before destructive hydrogenation to heat treatment with condensing catalysts such as aluminium chloride, boron fluoride, zinc chloride, etc., in the presence of gases having a "condensing" action, *e.g.*, air, steam, sulphur compounds, or chlorine. The products of the destructive hydrogenation are benzines, lubricating oils, etc.

313,124. ELECTROLYSIS. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, June 7, 1928.

In the production of per-compounds with amalgamated cathodes, *e.g.*, hydrogen peroxide by the electrolysis of a 1 per cent solution of phosphoric acid with a silver amalgam cathode, with passage of oxygen, the electrolyte is maintained saturated with sparingly soluble mercurous phosphate which is placed at the bottom of the vessel.

Specifications Accepted with Date of Application

287,924. Tetrazoles, Processes for preparing. A. Boehringer. March 30, 1927. Addition to 280,529.

288,554. Vat dyestuffs, Manufacture of. I.G. Farbenindustrie Akt.-Ges. April 11, 1927.

288,983. Azo-dyestuffs capable of after treatment with metallic salts, Manufacture of. I.G. Farbenindustrie Akt.-Ges. April 16, 1927.

297,726. Vulcanization of rubber. Rubber Service Laboratories Co. September 26, 1927.

298,090. Unsaturated hydrocarbons, Manufacture of. Soc. of Chemical Industry in Basle. October 1, 1927.

298,236. Hot purification of gases, Apparatus for. Compagnie Internationale pour la Fabrication des Essences et Petroles. October 6, 1927.

298,556. Thermally decomposing hydrocarbons, Process for. Electro Metallurgical Co. October 11, 1927.

300,250. Metallic alloy. Barber Asphalt Co. November 10, 1927.

303,879. Cracking hydrocarbon oils. Sinclair Refining Co. January 12, 1928.

304,640. Catalytic reduction and hydrogenation of organic nitrogen compounds. Selden Co. January 23, 1928.

315,673. Alloy-steel, Manufacture of. H. Wade. (*International Nickel Co.*) February 2, 1928.

315,813. Recovery of organic acids from the oxidation products of paraffin hydrocarbons, waxes, and the like. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) March 16, 1928.

315,892. Mono-carboxylic acids, Manufacture of. I.G. Farbenindustrie Akt.-Ges. February 17, 1928. Addition to 262,101.

315,895. Unsaturated hydrocarbons, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) March 16, 1928.

315,900. Catalytic reactions. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) April 13, 1928.

315,904. Titanium pigments, Manufacture of. B. Laporte, Ltd., I. E. Weber, and A. N. C. Bennett. April 17, 1928.

315,905. Dyes of the anthraquinone series and their application. Imperial Chemical Industries, Ltd., A. Shepherdson, and W. W. Tatum. April 19, 1928.

315,910. Sulphur dyestuffs, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) April 20, 1928.

315,911. Condensation products of the anthraquinone series, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) April 20, 1928.

315,991. Conversion of hydrocarbons of high boiling point into others of low boiling point. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) July 7, 1928.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID BORIC, COMMERCIAL.—Crystal, £30 per ton; powder, £32 per ton; extra fine powder, £34 per ton.

ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.

ACID NITRIC, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.

BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.

BLEACHING POWDER.—Spot, £9 10s. per ton d/d; Contract, £8 10s. per ton d/d, 4-ton lots.

BORAX, COMMERCIAL.—Crystals, £19 10s. to £20 per ton; granulated, £19 per ton; powder, £21 per ton. (Packed in 2 cwt. bags carriage paid any station in Great Britain.)

CALCIUM CHLORIDE (SOLID).—£5 to £5 5s. per ton d/d carr. paid.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 3d. to 1s. 8d. per gall. pyridinised industrial, 1s. 5d. to 1s. 10d. per gall.; mineralised 2s. 4d. to 2s. 8d. per gall.; 64 O.P., 1d. extra in all cases.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE.—4½d. per lb.

POTASSIUM CHLORATE.—3¾d. per lb., ex-wharf, London, in cwt. kegs.

SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.

SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

SODA CRYSTALS.—£5 to £5 5s. per ton, ex railway depots or ports.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE.—£10 10s. per ton. carr. paid.

SODIUM BICHROMATE.—3½d. per lb.

SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.r. London.

SODIUM CHLORATE.—2¾d. per lb.

SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.

SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.

SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.

SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.

SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.

SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.b. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—6¾d. to 7¾d. per lb. Crude 60's, 2s. 2d. per gall.

ACID CRESYLIC 99/100.—2s. 2d. to 2s. 7d. per gall. 97/99.—2s. 1d. to 2s. 2d. per gall. Pale, 95%, 1s. 9d. to 1s. 10d. per gall. Dark, 1s. 6d. to 1s. 7d.

ANTHRACENE.—A quality, 2d. to 2½d. per unit. 40%, £4 10s. per ton.

ANTHRACENE OIL, STRAINED, 1080/1090.—4¾d. to 5¼d. per gall. 1100, 5¼d. to 6d. per gall.; 1110, 6d. to 6¼d. per gall. Unstrained (Prices only nominal).

BENZOLE.—Prices at works: Crude, 10d. to 11d. per gall.; Standard Motor, 1s. 5d. to 1s. 6d. per gall.; 90%, 1s. 7d. to 1s. 8d. per gall; Pure, 1s. 10d. to 1s. 11d. per gall.

TOLUOLE.—90%, 1s. 7½d. to 2s. per gall. Firm. Pure, 2s. to 2s. 2d. per gall.

XYLOL.—1s. 5d. to 1s. 10d. per gall. Pure, 1s. 8d. to 2s. 1d. per gall.

CREOSOTE.—Cresylic, 20/24%, 6¾d. to 7d. per gall.; Heavy, 6¼d. to 6¾d. per gall. Middle oil, 4½d. to 5d. per gall. Standard specification, 3d. to 4d. per gall. Light gravity, 2d. to 2½d. per gall. ex works. Salty, 7½d. per gall.

NAPHTHA.—Crude, 8d¼. to 8¾d. per gall. Solvent, 90/160, 1s. 3d. to 1s. 3½d. per gall. Solvent, 95/160, 1s. 4d. to 1s. 5d. per gall. Solvent 90/190, 1s. to 1s. 3d. per gall.

NAPHTHALENE, CRUDE.—Drained Creosote Salts, £4 10s. to £5 per ton. Whizzed, £5 per ton. Hot pressed, £8 10s. per ton.

NAPHTHALENE.—Crystals, £12 5s. to £14 10s. per ton. Quiet Flaked, £14 to £15 per ton, according to districts.

PITCH.—Medium soft, 40s. to 45s. per ton, f.o.b., according to district. Nominal.

PYRIDINE.—90/140, 3s. 9d. to 4s. per gall. 90/160, 3s. 6d. to 3s. 9d. per gall. 90/180, 1s. 9d. to 2s. 3d. per gall. Heavy, prices only nominal.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—6s. per lb. 100%.

ACID BENZOIC.—1s. 8½d. per lb.

ACID GAMMA.—4s. 6d. per lb.

ACID H.—3s. per lb.

ACID NAPHTHIONIC.—1s. 6d. per lb.

ACID NEVILLE AND WINTHER.—4s. 9d. per lb.

ACID SULPHANILIC.—8½d. per lb.

ANILINE OIL.—8d. per lb. naked at works.

ANILINE SALTS.—8d. per lb. naked at works.

BENZALDEHYDE.—2s. 3d. per lb.

BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.

BENZOIC ACID.—1s. 8½d. per lb.

o-CRESOL 29/31° C.—5½d. per lb.

m-CRESOL 98/100%.—2s. 3d. to 2s. 6d. per lb.

p-CRESOL 32/34° C.—2s. 3d. to 2s. 6d. per lb.

DICHLORANILINE.—1s. 10d. per lb.

DIMETHYLANILINE.—1s. 11d. per lb.

DINITROBENZENE.—8d. per lb. naked at works. £75 per ton.

DINITROCHLORBENZENE.—£84 per ton d/d.

DINITROTOLUENE.—48/50° C. 7½d. per lb. naked at works. 66/68° C. 9d. per lb. naked at works.

DIPHENYLAMINE.—2s. 10d. per lb. d/d.

a-NAPHTHOL.—2s. per lb. d/d.

B-NAPHTHOL.—10d. per lb. d/d.

a-NAPHTHYLAMINE.—1s. 3d. per lb.

B-NAPHTHYLAMINE.—3s. per lb.

o-NITRANILINE.—5s. 9d. per lb.

m-NITRANILINE.—3s. per lb. d/d.

p-NITRANILINE.—1s. 8d. per lb.

NITROBENZENE.—6d. per lb. naked at works.

NITRONAPHTHALENE.—1s. 3d. per lb.

R. SALT.—2s. 2d. per lb.

SODIUM NAPHTHIONATE.—1s. 8½d. per lb. 100% basis d/d.

o-TOLUIDINE.—8d. per lb.

p-TOLUIDINE.—1s. 9d. per lb. naked at works.

m-XYLIDINE ACETATE.—2s. 6d. per lb. 100%.

N. W. ACID.—4s. 9d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £9 15s. to £10 5s. per ton. Grey, £16 10s. to £17 10s. per ton. Liquor, 9d. per gall.

ACETONE.—£78 per ton.

CHARCOAL.—£6 to £8 10s. per ton, according to grade and locality.

IRON LIQUOR.—1s. 3d. per gall, 32° Tw. 1s. per gall. 24° Tw.

RED LIQUOR.—9d. to 10½d. per gall. 16° Tw.

WOOD CREOSOTE.—1s. 9d. per gall. Unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 8d. to 3s. 11d. per gall. Solvent, 4s. to 4s. 3d. per gall.

WOOD TAR.—£3 10s. to £4 10s. per ton.

BROWN SUGAR OF LEAD.—£38 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 3d. per lb. according to quality; Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—1s. 10d. to 2s. per lb.

BARYTES.—£5 10s. to £7 per ton, according to quality.

CADMIUM SULPHIDE.—5s. to 6s. per lb.

CARBON BISULPHIDE.—£25 to £27 10s. per ton, according to quantity

CARBON BLACK.—5¼d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£40 to £50 per ton, according to quantity, drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—3s. 9d. per lb.

INDIARUBBER SUBSTITUTES, WHITE AND DARK.—4¾d. to 5¾d. per lb.

LAMP BLACK.—£30 per ton, barrels free.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE, 30%.—£20 to £22 per ton.

MINERAL RUBBER "RUBPRON."—£13 12s. 6d. per ton, f.o.r. London.

SULPHUR.—£10 to £13 per ton, according to quality.

SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra

SULPHUR PRECIP. B. P.—£55 to £60 per ton.

THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb., carriage paid.

THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.

VERMILION, PALE OR DEEP.—6s. 6d. to 6s. 9d. per lb.

ZINC SULPHIDE.—8d. to 11d. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£37 per ton ex wharf London, barrels free.

ACID, ACETYL SALICYLIC.—2s. 10½d. per lb., in 1-cwt. lots.

ACID, BENZOIC, B.P.—2s. to 3s. 3d. per lb., according to quantity. Solely ex Gum, 1s. 6d. per oz.; 50-oz. lots, 1s. 3d. per oz.

ACID, BORIC B.P.—Crystal, 36s. to 39s. per cwt.; powder, 40s. to 43s. per cwt.; extra fine powder, 42s. per cwt., according to quantity. Carraige paid any station in Great Britain, in ton lots.
ACID, CAMPHORIC.—19s. to 21s. per lb.
ACID, CITRIC.—2s. 0½d. to 2s. 2d. per lb., less 5%.
ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.
ACID, MOLYBDIC.—5s. 3d. per lb. in ¼ cwt. lots. Packages extra. Special prices for quantities and contracts.
ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d.
ACID, SALICYLIC, B.P. PULV.—1s. 5d. to 1s. 7d. per lb. Technical.—10½d. to 11½d. per lb.
ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.
ACID, TARTARIC.—1s. 4½d. per lb., less 5%.
ACETANILIDE.—1s. 5d. to 1s. 8d. per lb. for quantities.
AMIDOL.—7s. 6d. to 9s. per lb., d/d.
AMIDOPYRIN.—7s. 9d. to 8s. per lb.
AMMONIUM BENZOATE.—3s. 3d. to 3s. 9d. per lb., according to quantity. 18s. per lb. ex Gum.
AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5 cwt. casks. Resublimated, 1s. per lb.
AMMONIUM MOLYBDATE.—4s. 9d. per lb. in ¼ cwt. lots. Packages extra. Special prices for quantities and contracts.
ATROPHINE SULPHATE.—9s. per oz.
BARBITONE —5s. 9d. to 6s. per lb.
BENZONAPHTHOL.—3s. to 3s. 3d. per lb. spot.
BISMUTH CARBONATE.—8s. 9d. per lb.
BISMUTH CITRATE.—8s. 3d. per lb.
BISMUTH SALICYLATE.—8s. 3d. per lb.
BISMUTH SUBNITRATE.—7s. 6d. per lb.
BISMUTH NITRATE.—Cryst. 5s. 3d. per lb.
BISMUTH OXIDE.—11s. 3d. per lb.
BISMUTH SUBCHLORIDE.—10s. 3d. per lb.
BISMUTH SUBGALLATE.—7s. 3d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.
BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 0½d. per lb.; 12 W. Qts. 11½d. per lb.; 36 W Qts. 11d. per lb.
BORAX B.P.—Crystal, 24s. to 27s. per cwt.; powder, 25s. to 28s. per cwt., according to quantity. Carriage paid any station in Great Britain, in ton lots.
BROMIDES.—Ammonium, 1s. 11½d. per lb.; potassium, 1s. 8½d. per lb.; granular, 1s. 7½d. per lb.; sodium, 1s. 10½d. per lb. Prices for 1 cwt. lots.
CALCIUM LACTATE.—B.P., 1s. 2½d. to 1s. 3d. per lb., in 1-cwt. lots.
CAMPHOR.—Refined flowers, 2s. 11d. to 3s. per lb., according to quantity; also special contract prices.
CHLORAL HYDRATE.—3s. 1d. to 3s. 4d. per lb.
CHLOROFORM.—2s. 4½d. to 2s. 7½d. per lb., according to quantity.
CREOSOTE CARBONATE.—6s. per lb.
ETHERS.—S.G. ·730—11d. to 1s. per lb., according to quantity other gravities at proportionate prices.
FORMALDEHYDE, 40%.—37s. per cwt., in barrels, ex wharf.
GUAIACOL CARBONATE.—4s. 6d. to 4s. 9d. per lb.
HEXAMINE.—2s. 3d. to 2s. 6d. per lb.
HOMATROPINE HYDROBROMIDE.—30s. per oz.
HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.
HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. Winchesters, 2s. 11d. per gall. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 4s. per gall.
HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.
HYPOPHOSPHITES.—Calcium, 2s. 5d. per lb.; potassium, 2s. 8½d. per lb.; sodium, 2s. 7½d. per lb., in 1 cwt. lots, assorted.
IRON AMMONIUM CITRATE.—B.P., 2s. 8d. to 2s. 11d. per lb. Green, 3s. 1d. to 3s. 4d. per lb. U.S.P., 2s. 9d. to 3s. per lb.
IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.
IRON QUININE CITRATE.—B.P., 8½d. to 9½d. per oz., according to quantity.
MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.
MAGNESIUM OXIDE.—Light commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.
MENTHOL.—A.B.R. recrystallised B.P., 19s. 9d. per lb. net; Synthetic, 12s. to 14s. per lb.; Synthetic detached crystals, 12s. to 16s. per lb., according to quantity; Liquid (95%), 9s. per lb.
MERCURIALS B.P.—Up to 1 cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d. per lb.; Corrosive Sublimate, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide, 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.
METHYL SALICYLATE.—1s. 5d. to 1s. 8d. per lb.
METHYL SULPHONAL.—18s. 6d. to 20s. per lb.
METOL.—9s. to 11s. 6d. per lb. British make.
PARAFORMALDEHYDE.—1s. 9d. per lb. for 100% powder.
PARALDEHYDE.—1s. 4d. per lb.
PHENACETIN.—2s. 6d. to 2s. 9d. per lb.
PHENAZONE.—3s. 11d. to 4s. 2d. per lb.
PHENOLPHTHALEIN.—6s. to 6s. 3d. per lb.
POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—102s. per cwt., less 2½ per cent.
POTASSIUM CITRATE.—B.P.C., 2s. 7d. per lb. in 1 cwt. lots.
POTASSIUM FERRICYANIDE.—1s. 9d. per lb., in cwt. lots.
POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.
POTASSIUM METABISULPHITE.—6d. per lb., 1-cwt. kegs included f.o.r. London.
POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.
QUININE SULPHATE.—1s. 8d. to 1s. 9d. per oz., bulk in 100 oz. tins.
RESORCIN.—2s. 10d. to 3s. per lb., spot.
SACCHARIN.—47s. per lb.; in quantity lower.
SALOL.—2s. 3d. to 2s. 6d. per lb.
SODIUM BENZOATE, B.P.—1s. 8d. to 1s. 11d. per lb.
SODIUM CITRATE, B.P.C., 1911.—2s. 4d. per lb., B.P.C. 1923—2s. 7d. per lb. Prices for 1 cwt. lots. U.S.P., 2s. 6d. to 2s. 9d. per lb., according to quantity.
SODIUM FERROCYANIDE.—4d. per lb., carriage paid.
SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.
SODIUM NITROPRUSSIDE.—16s. per lb.
SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—100s. to 105s. per cwt. Crystals, 5s. per cwt. extra.
SODIUM SALICYLATE.—Powder, 2s. 2d. to 2s. 5d. per lb. Crystal, 2s. 3d. to 2s. 6d. per lb.
SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 1d. per lb.
SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £29 10s. per ton, according to quantity. Delivered U.K.
SULPHONAL.—9s. 6d. to 10s. per lb.
TARTAR EMETIC, B.P.—Crystal or powder, 2s. 1d. to 2s. 3d. per lb.
THYMOL.—Puriss., 9s. 1d. to 9s. 4d. per lb., according to quantity. Firmer. Natural, 12s. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.
AUBEPINE (EX ANETHOL).—12s. per lb.
AMYL ACETATE.—2s. 6d. per lb.
AMYL BUTYRATE.—5s. per lb.
AMYL SALICYLATE.—2s. 9d. per lb.
ANETHOL (M.P. 21/22° C.).—5s. 6d. per lb.
BENZALDEHYDE FREE FROM CHLORINE.—2s. 3d. per lb.
BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—1s. 10d. per lb.
BENZYL ALCOHOL FREE FROM CHLORINE.—1s. 10d. per lb.
BENZYL BENZOATE.—2s. 3d. per lb.
CINNAMIC ALDEHYDE NATURAL.—14s. per lb.
COUMARIN.—8s. 9d. per lb.
CITRONELLOL.—10s. per lb.
CITRAL.—8s. per lb.
ETHYL CINNAMATE.—6s. 6d. per lb.
ETHYL PHTHALATE.—3s. per lb.
EUGENOL.—12s. per lb.
GERANIOL (PALMAROSA).—21s. per lb.
GERANIOL.—6s. 6d. to 10s. per lb.
HELIOTROPINE.—6s. 9d. per lb.
ISO EUGENOL.—14s. 3d. per lb.
LINALOL.—Ex Bois de Rose, 12s. 6d. per lb. Ex Shui Oil, 10s. per lb.
LINALYL ACETATE.—Ex Bois de Rose, 16s. per lb. Ex Shui Oil, 12s. per lb.
METHYL ANTHRANILATE.—8s. per lb.
METHYL BENZOATE.—4s. per lb.
MUSK KETONE.—34s. per lb.
MUSK XYLOL.—7s. per lb.
NEROLIN.—3s. 9d. per lb.
PHENYL ETHYL ACETATE.—11s. per lb.
PHENYL ETHYL ALCOHOL.—10s. per lb.
RHODINOL.—56s. per lb.
SAFROL.—2s. 6d. per lb.
TERPINEOL.—1s. 6d. per lb.
VANILLIN, EX CLOVE OIL.—17s. 6d. per lb. Ex Guaiacol, 15s. 6d. per lb.

Essential Oils

ALMOND OIL.—Foreign S.P.A., 10s. 6d. per lb.
ANISE OIL.—3s. 6d. per lb.
BERGAMOT OIL.—17s. 6d. per lb.
BOURBON GERANIUM OIL.—22s. per lb.
CANANGA OIL, JAVA.—11s. 6d. per lb.
CASSIA OIL, 80/85%.—6s. 3d. per lb.
CINNAMON OIL LEAF.—7s. 9d. per oz.
CITRONELLA OIL.—Java, 2s. 8d. per lb., c.i.f. U.K. port. Ceylon, pure, 2s. 4d. per lb.
CLOVE OIL (90/92%).—9s. per lb.
EUCALYPTUS OIL, AUSTRALIAN, B.P. 70/75%.—1s. 10d. per lb.
LAVENDER OIL.—Mont Blanc, 38/40%, 16s. per lb.
LEMON OIL.—17s. per lb.
LEMONGRASS OIL.—4s. per lb.
ORANGE OIL, SWEET.—20s. per lb.
OTTO OF ROSE OIL.—Anatolian, 70s. per oz. Bulgarian, 110s. per oz.
PALMA ROSA OIL.—12s. 3d. per lb.
PEPPERMINT OIL.—English, 87s. 6d. per lb.; Wayne County, 14s. 3d. per lb.; Japanese, 7s. per lb.
PETITGRAIN.—8s. 9d. per lb.
SANDALWOOD.—Mysore, 31s. per lb.: 90/95%. 19s. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, August 8, 1929.

NOTWITHSTANDING the holidays, business has been quite brisk during the current week. Prices remain steady. Export business has also been quite good.

General Chemicals

ACETONE is firm at £75 to £85 per ton, and in steady demand.

ACID ACETIC.—The brisk demand continues, with a little better supply. Price is firm at £36 10s. for 80% technical quality.

ACID CITRIC.—Firm at 2s. 2d. to 2s. 3d. per lb.

ACID FORMIC.—In steady demand at about £41 to £42 per ton for 85%, in carboys.

ACID LACTIC is unchanged and firm at £43 per ton for 50% weight, standard pale quality.

ACID TARTARIC is exceedingly firm, with price advancing at 1s. 5d. per lb., less 5%.

SULPHATE OF ALUMINA.—Firm at £7 15s. to £8 per ton, and in very good demand.

ARSENIC is unchanged at £16 5s. per ton, free on rails the mines.

BARIUM CHLORIDE is still in very short supply for prompt delivery. Price firm at £12 per ton, ex store, and in very good demand.

CREAM OF TARTAR.—The position is exceedingly firm at £100 to 105 per ton for 99/100% B.P. quality. Still higher prices are expected in the near future.

COPPER SULPHATE.—Steady at about £26 per ton.

FORMALDEHYDE.—The demand is maintained and price steady at about £38 per ton.

LEAD ACETATE.—In good demand at £43 10s. for white, and £42 10s. per ton for brown.

LEAD NITRATE.—Unchanged at about £33 15s. per ton, with an improved demand.

LIME ACETATE.—Firm, and in short supply, at £18 per ton.

LITHOPONE.—Unchanged at £19 15s. to £23 per ton, and in steady request.

METHYL ACETONE.—£58 to £60 per ton, and in steady demand.

CHLORATE OF POTASH.—Unchanged at £28 to £30 per ton.

PERMANGANATE OF POTASH.—The brisk demand continues. The price is firm at 5¼d. to 5⅝d. per lb.

POTASSIUM PRUSSIATE.—Firm at £63 10s. to £65 10s., according to quantity, and in good demand.

SODIUM ACETATE CRYSTALS.—Firm at £22 10s. to £23 10s. per ton, with crystals still in short supply.

SODIUM BICHROMATE.—Price unchanged at 3⅜d. per lb., with discounts for contracts.

SODA HYPO PHOTOGRAPHIC CRYSTALS.—Firm at £14 10s. to £15 per ton.

SODA NITRITE.—Firm at £20 per ton, and in brisk demand.

SODA PHOSPHATE.—The improved demand continues. Price unchanged at £12 per ton for dibasic and £16 10s. per ton for tribasic.

SODA PRUSSIATE. is unchanged at 4¾d. to 5½d. per lb.

TARTAR EMETIC.—The improved demand continues. Price unchanged at 11d. per lb.

ZINC SULPHATE is steady at £12 per ton.

Coal Tar Products

There is very little change to report in the market for coal tar products from last week, prices remaining firm.

MOTOR BENZOL is unchanged, at about 1s. 5½d. to 1s. 6d. per gallon, f.o.r. makers' works.

SOLVENT NAPHTHA is quoted at about 1s. 2d. to 1s. 2½d. per gallon, f.o.r.

HEAVY NAPHTHA remains at about 1s. 1d. per gallon, f.o.r.

CREOSOTE OIL remains at 3½d. to 4d. per gallon on rails in the North, and at 4¾d. per gallon in London.

CRESYLIC ACID is unchanged, at about 1s. 10d. per gallon for the 98/100% quality, and 1s. 7d. per gallon for the dark quality, 95/97%.

NAPHTHALENES remain firm, at about £4 10s. per ton for the firelighter quality, £5 per ton for the 74/76 quality, and £6 to £6 5s. per ton for the 76/78 quality.

PITCH.—There is no change in the pitch market, which remains steady at 40s. to 42s. per ton, f.o.b. East Coast, with little buying interest.

Nitrogen Products

Sulphate of Ammonia.—The market for sulphate of ammonia continues quiet, but the price remains steady at £8 15s. 9d. per ton f.o.b. U.K. port, in single bags, for prompt shipment. As stocks are large in most consuming countries, no brisk buying has been reported.

Home.—Apart from purchases made by fertiliser manufacturers, the home market is quite uninteresting, because no prices are announced for delivery beyond September.

Nitrate of Soda.—There is no change to report. The market continues sluggish.

Japanese Imports of Fertiliser Materials

THE following table shows details of the imports of fertiliser materials into Japan during 1928 :—

	METRIC TONS.
Ammonium sulphate	282,227
Nitrate of soda	52,225
Sulphate of potash	35,025
Chloride of potash	21,024
Bone meal	35,710
Phosphate rock	469,555
Bean cake	973,783
Other oil cake	157,993
Animal bone	14,278
Other fertilisers	42,613

Ammonium sulphate was furnished principally by Germany (130,168 tons), the United Kingdom (97,238 tons), and the United States (28,190 tons). Germany supplied practically all of the sulphate of potash imports, but such was not the case with chloride of potash, of which the principal sources were the United States (13,654 tons) and Spain (3,626 tons). Bone meal was furnished by China (19,952 tons), India (7,570 tons) and Kwantung (7,561 tons); phosphate rock by the United States (160,831 tons), Egypt (90,000 tons) and other North African countries (22,270 tons).

Latest Oil Prices

LONDON, August 7.—LINSEED OIL closed steady at a net decline of 12s. 6d. to 15s. per ton; spot, ex mill, £37; August, £35; September, £34 15s.; September-December, £34 10s.; and January-April, £34 5s. RAPE OIL was quiet. Crude extracted, £41; technical refined, £43, naked, ex wharf. COTTON OIL was steady. Egyptian crude, £33 10s.; refined common edible, £38; and deodorised, £40, naked, ex mill. TURPENTINE was quiet, unchanged; American spot, and September-December, 42s. 6d. per cwt.

HULL, August 7.—LINSEED OIL.—Spot, £37 10s.; August, £36 15s.; September, £36 5s.; September-December, £35 7s. 6d. per ton, naked. COTTON OIL.—Egyptian crude, spot, £33; November-December, £30; edible refined, spot, £36 5s.; technical, spot, £36; deodorised, spot, £38 5s. per ton, naked. PALM KERNEL OIL.—Crude, spot, 5½ per cent., £35 10 . per ton, naked. GROUNDNUT OIL.—Crushed-extracted, spot, £36 10s.; deodorised, spot, £40 10s. per ton. SOYA OIL.—Extracted, spot, and crushed, spot, £34 10s.; deodorised, spot, £38 per ton. RAPE OIL.—Crushed-extracted, spot, £41 10s.; refined, spot, £43 10s. per ton. TURPENTINE.—Spot, 45s. per cwt. CASTOR OIL and COD OIL.—Unchanged, net cash terms, ex mill.

South Wales By-Products

WITH the holidays taking three days out of the week, there has been very little business in by-products in South Wales. The general call has been small. Pitch maintains its slight increase in values, but the big users, especially the patent fuel manufacturers, appear to be holding off in the hope that the present basis of 30s. to 43s. per ton will see a fall within the next few weeks. Road tar is unchanged at 10s. 6d. to 13s. per 40 gallon barrel. Crude tar is being quoted at 25s. to 30s. per ton, but has only a small demand. Refined tars continue to be a bright feature, with both coke oven and gasworks tar maintaining their values. Solvent-naphtha is on offer round the 1s. 3d. to 1s. 6d. per gallon mark, while motor benzol is quoted at 1s. 4½d. to 1s. 7d. per gallon. Oil imports over the last four ascertainable weeks amounted to 20,654,245 gallons.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, August 7, 1929.

THE improvement in business in the heavy chemical market indicated last week has been maintained, with good inquiries both for home and export. There is little or no change to report in prices.

Industrial Chemicals

ACETONE.—B.G.S. £76 10s. to £85 per ton ex wharf, according to quantity. Inquiry remains satisfactory.

ACID ACETIC.—This material is still scarce for immediate supply but prices remain unchanged as follows: 98/100% glacial, £56 to £67 per ton according to quality and packing, c.i.f. U.K. Ports; 80% pure, £37 10s. per ton ex wharf; 80% technical, £37 10s. per ton ex wharf.

ACID BORIC.—Crystals, granulated or small flakes, £30 per ton. Powder, £32 per ton, packed in bags carriage paid U.K. stations. There are a few fairly cheap offers made from the Continent.

ACID CARBOLIC ICE CRYSTALS.—In good demand and price increased to about 6¾d. per lb. delivered or f.o.b. U.K. ports.

ACID CITRIC B.P. CRYSTALS.—Quoted 2s. 2d. per lb., less 5% ex store, prompt delivery. Rather cheaper offers for early delivery from the Continent.

ACID HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy. Dearsenicated quality, 5s. 6d. per carboy ex works, full wagon loads.

ACID NITRIC, 80° QUALITY.—£24 10s. per ton ex station, full truck loads.

ACID OXALIC, 98/100%.—On offer at about 3¼d. per lb., ex store. Offered from the Continent at 3⅛d. per lb., ex wharf.

ACID SULPHURIC.—£2 15s. per ton, ex works for 144° quality, £5 15s. per ton for 168°. Dearsenicated quality, 20s. per ton extra.

ACID TARTARIC, B.P. CRYSTALS.—Spot material now quoted 1s. 4½d. per lb., less 5% ex wharf.

ALUMINA SULPHATE.—Quoted at round about £7 10s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted £8 7s. 6d. per ton, c.i.f. U.K. ports. Crystal meal about 2s. 6d. per ton less.

AMMONIA ANHYDROUS.—Quoted 7½d. per lb., carriage paid. Containers extra and returnable.

AMMONIA, CARBONATE.—Lump quality quoted £36 per ton. Powdered, £38 per ton, packed in 5 cwt. casks delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Quoted £35 per ton, c.i.f. U.K. ports. Spot material on offer at about £39 per ton, ex store.

ARSENIC, WHITE POWDERED.—Unchanged at £18 5s. per ton, ex wharf, prompt despatch from mines. Spot material quoted £19 15s. per ton, ex store.

BARIUM CHLORIDE.—Quoted £10 10s. per ton, c.i.f. U.K. ports, prompt shipment.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 12s. 6d. per ton, delivered in minimum 4-ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price, £4 5s. per ton to £4 15s. per ton, according to quantity and point of delivery. Continental material on offer at £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 10s. per ton, f.o.r. works or £4 12s. 6d. per ton, f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Remains steady at about £36 10s. per ton, ex store.

GLAUBER SALTS.—English material, quoted £4 10s. per ton, ex station. Continental on offer at about £3 5s. per ton, ex wharf.

LEAD, RED.—Quoted £36 to £36 10s. per ton, according to quantity, delivered buyers' works.

LEAD, WHITE.—Quoted £37 10s. per ton, c.i.f. U.K. ports.

LEAD ACETATE.—White crystals quoted £41 10s. per ton. Brown on offer at about £39 10s. per ton, ex store.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store. In moderate demand.

METHYLATED SPIRIT.—Industrial quality, 64 O.P., quoted 1s. 4d. per gallon, less 2½% delivered.

POTASSIUM BICHROMATE.—Quoted 4⅝d. per lb., delivered U.K. or c.i.f. Irish ports, with an allowance of 2½% for minimum 2½ tons to be taken.

POTASSIUM CARBONATE, 96/98%.—Spot material now quoted £26 10s. per ton, ex store. Offered from the Continent at £25 10s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99¾/100%.—Powder quoted £25 10s. per ton, ex wharf. Crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £19 2s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 5¼d. per lb., ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Spot material quoted 7d. per lb., ex store. Offered for prompt delivery from the Continent at about 6¾d. per lb., ex wharf.

SODA, CAUSTIC.—Powdered, 98/99%, £17 10s. per ton in drums; £18 15s. per ton in casks. Solid, 76/77%, £14 10s. per ton in drums, and 70/75%, £14 2s. 6d. per ton in drums, all carriage paid buyers' stations, minimum 4-ton lots, for contracts 10s. per ton less.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3⅝d. per lb., delivered buyers' premises, with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station. Powdered or pea quality 27s. 6d. per ton extra. Light soda ash £7 1s. 3d. per ton, ex quay, minimum 4-ton lots, with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum 4-ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum 4-ton lots. Prices for this year unchanged.

SODIUM NITRATE.—Ordinary quality £10 13s. per ton, carriage paid buyers' sidings, minimum 6-ton lots, with usual extras for smaller quantities and refined qualities.

SODIUM PRUSSIATE.—Spot material on offer at 5½d. per lb., ex, store. Quoted 5⅜d. per lb., ex wharf to go forward.

SODIUM SULPHATE (SALTCAKE).—Prices 50s. per ton, ex works 52s. 6d. per ton delivered for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption:—Solid 60/62%, £9 per ton; broken, 60/63%, £10 per ton; crystals, 30/32%, £7 2s. 6d. per ton, delivered buyers' works on contract, minimum 4-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton; rock, £10 7s. 6d. per ton; ground American, £9 5s. per ton, ex store.

ZINC CHLORIDE, 98%.—British material now quoted at £22 10s. per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Offered from the Continent at about £10 5s. per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small quantities.

Brazilian Monopoly in Carnauba Wax

DESPITE numerous and more or less successful attempts to grow the carnauba palm in other countries, particularly in Ceylon, Brazil still has a practical monopoly of the world's trade in carnauba wax. A substitute for carnauba wax has been produced in Germany for some time, but for some processes it is necessary to mix gorduroso (a grade of natural carnauba wax) with the synthetic product in order to obtain satisfactory results. In Brazil, the cutting of the leaves and sprouts preparatory to extracting the wax generally takes place during the dry season, that is, from September to February or March. During the dry years the yield of wax is 25 per cent. above the average. Exports of carnauba wax from Brazil from 1921 to 1927, inclusive, were as follows:—

YEAR.	KILOS.
1921	5,905,605
1922	5,004,648
1923	3,341,272
1924	4,991,801
1925	4,114,591
1926	5,768,000
1927	7,033,520

Exports during the first eight months of 1928 declined appreciably, both in price and value, as compared with same months of last year. The United States takes about 40 per cent. of the exports of carnauba wax and Germany and Great Britain about 20 per cent. each. About 60 per cent. of all exports are from the ports of Fortaleza, State of Ceara, and 30 per cent. from the port of Ilha Cajueiro, State of Maronhao.

Manchester Chemical Market

(From Our Own Correspondent.)

Manchester, August 8, 1929.

During a large part of the past week the holidays have had a restrictive influence on the demand for chemical products on the open market here and have also made their influence felt on deliveries against contracts, so that altogether conditions have been relatively quiet. Another important factor which does not make for market activity is the wage trouble in the cotton industry, which, before long, if a settlement is not reached, will have an increasingly serious effect on operations in the textile bleaching, dyeing and finishing trades.

Heavy Chemicals

There is still only a comparatively quiet business being done in the case of sulphide of sodium, but offers of this material are about maintained at round £9 per ton for the 60-65 per cent. concentrated solid quality and £7 10s. for the commercial. Prussiate of soda meets with a moderate demand and values in this section are quite steady at from 4¾d. to 5¼d. per lb., according to quantity. Caustic soda is fairly active and prices are firm on a contract basis of £12 15s. to £14 per ton, according to strength. Chlorate of soda this week has only been in quiet request at about 2⅝d. per lb., with bichromate in fair inquiry at 3⅜d. Alkali is well held at £6 per ton and bicarbonate of soda at round £10 10s., and in both cases buying interest during the past week has been on moderate lines. Phosphate of soda is attracting only a limited amount of inquiry at the moment and at about £11 5s. per ton offers of this material are on a somewhat lower level. There is a moderate demand about in the case of hyposulphite of soda, quotations for which are reasonably steady at from £8 15s. to £9 per ton for the commercial grade and about £15 10s. for the photographic. With regard to saltcake, inquiry in this section has been on comparatively quiet lines, but at £2 10s. to £2 15s. per ton prices show little alteration on the week.

Yellow prussiate of potash is in moderate request and values are well maintained at from 6¾d. to 7¼d. per lb., according to quantity. Somewhat easy conditions are in evidence in the case of carbonate of potash, offers of the 96-98 per cent. solid material ranging from £25 to £25 10s. per ton. There is a quiet demand about for caustic potash which is quoted at from £32 10s. per ton upwards. Permanganate of potash is only in moderate request but prices are well held at about 5½d. per lb. for the B.P. grade and 5¼d. for the commercial quality. There has been a fair movement of bichromate of potash on the basis of 4¼d. per lb. For chlorate of potash, however, inquiry during the past week has been of limited extent, with quotations ranging from 2¾d. to 3d. per lb., according to quantity.

Sulphate of copper is not particularly active at the moment and at £26 10s. to £27 per ton, f.o.b., supplies of this material are obtainable at lower levels. There is a quiet trade passing in arsenic, with prices unchanged at about £16 per ton at the mines for white powdered, Cornish makes. Acetate of lime is steady but only in moderate demand at £16 10s. per ton for the grey and round £8 5s. for the brown. Acetate of lead is moving off in limited quantities, with the white material still in the neighbourhood of £40 per ton and the brown at £39. Nitrate of lead is quiet at about £33 15s. per ton.

Acids and Tar Products

Tartaric acid is firmer and up to 1s. 5d. per lb. has been quoted on this market since last report. Citric acid meets with a moderate amount of inquiry, but values of this are maintained at round 2s. 1d. per lb. Acetic acid keeps very firm and a quietly steady trade is being done; the 80 per cent. commercial quality is on offer at £36 per ton and the glacial at about £67. Oxalic acid is on the slow side at £1 12s. 6d. per cwt., ex store.

Pitch is steady at the higher level of up to £2 5s. per ton, f.o.b., but only a moderate tonnage has been booked this week. Creosote oil is on the quiet side still at from 2¾d. to 3d. per gallon, naked at works. Carbolic acid is in steady request with values very firm at about 7¾d. per lb. for crystals and 2s. 3d. per gallon for 60's crude. Solvent naphtha is steady and in fair demand at round 1s. 2d. per gallon, at works.

Company News

International Paint and Compositions.—Interim 3 per cent. on ordinary shares, payable September 30 (same).

Tehidy Minerals.—The directors have declared an interim dividend in respect of the year ending December 31, 1929, of 3d. per share, free of tax, payable on August 14, 1929, to all shareholders registered in the books of the company on July 30.

Benn Brothers.—Net profit for year to June 30, £48,624 (against £44,626). Final dividend of 13¾ per cent. on ordinary shares, making 20 per cent. (against 17½ per cent.), and of 2s. 9d. per share on deferred, making 4s. per share (against 3s. 6d.); £1,500 to leasehold reserve, as before; £10,200 to general reserve (against £10,891); and £20,428 forward, compared with £19,355. During the year three old-established journals have been added to the company's list of publications.

W. and H. M. Goulding.—The report for the year ended June 30, 1929, states that the net profits, including dividends from investments and subsidiary companies, and after making provision for discounts on outstanding account, amount to £36,654 (against £33,065). This, with £3,638 from last account, leaves, £40,292. After providing for usual debenture interest, and fixed dividend at rate of 5½ per cent. on preference shares, the directors recommend dividend of 6 per cent. on the ordinary shares for the year, of which 3s. per share was payable on July 31 and the second 3s. per share at December 31 next, less tax. The directors further recommend that £6,000 be carried to depreciation account.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

Heavy Industrial Chemicals.—An Indian firm of commission agents and merchants in Karachi are desirous of obtaining further British agencies. (Reference No. 163.)

Red Oxide Paint.—The South African Railways and Harbours Administration is calling for tenders, to be presented in South Africa by September 19, for the supply of red oxide paint. (Reference No. B.X. 5,535.)

Red Lead.—The South African Railways and Harbours Administration is calling for tenders (to be presented in Johannesburg by September 12, 1929), for the supply of 52,300 lb. of genuine red lead (dry). (Reference number B.X. 5521.)

Calcium Carbide.—The South African Railways and Harbours Administration are calling for tenders, to be presented in Johannesburg not later than 1 p.m. on Thursday, September 19, 1929, for the supply and delivery of 290,500 lbs. of calcium carbide. (Reference B.X. 5,536.)

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks, and Designs.

Opposition to the Registration of the following Trade Marks can be lodged up to September 7, 1929.

Dextramite.

501,134. Class 1. Chemical substances used in manufactures, photography or philosophical research, and anti-corrosives. The Chemical and Insulating Co., Ltd., West Auckland Road, Darlington, County Durham: manufacturers. March 20, 1929.

Selvadin.

503,192. Class 3. Chemical substances prepared for use in medicine and pharmacy, but not including medicated preparation for the teeth and mouth and not including any good of a like kind to these excluded good. Bayer Products, Ltd., 31 to 34, Basinghall Street, London, E.C.2; merchants and manufacturers. May 30, 1929.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Receivership

VOXOL PRODUCTS CO. (1919), LTD. (R., 10/8/29.) R. F. Leather, of Wellington Buildings, Strand, Liverpool, was appointed receiver on July 22, 1929, under powers contained in second debenture dated April 14, 1920. W. D. Owen, of Porth-y-Waen, Bala, Merionethshire, ceased to act as receiver or manager on July 22, 1929.

London Gazette, &c.

Company Winding Up

BLUE BIRD OIL IMPORTERS, LTD. (C.W.U., 10/8/29.) First meetings August 14, creditors at 2.15 p.m. and contributories at 3.15 p.m., Kingsway Hall, Kingsway, London, W.C.2.

BLUE BIRD PETROL, LTD. (C.W.U., 10/8/29.) First meetings August 14, creditors' at 11 a.m. and contributories' at 12 noon, Kingsway Hall, Kingsway, London, W.C.2.

Companies Winding Up Voluntarily

FISON (JOSEPH) AND CO., LTD. (C.W.U.V., 10/8/29.) At an extraordinary general meeting held at the company's offices, Gippeswyk Avenue, Ipswich, on July 15, the following special resolution was duly passed, and at a subsequent extraordinary general meeting held at the same place on July 30 was duly confirmed: "That it is expedient to effect an amalgamation of this company with Packards and James Fison (Thetford), Ltd. and with Prentice Brothers, Ltd., and that with a view thereto this company be wound up voluntarily; and that William Roberts Wolton be appointed liquidator for the purpose of such winding-up." Notice is given that a meeting of the creditors of Joseph Fison and Co., Ltd. will be held at the offices of the company, Gippeswyk Avenue, Ipswich, on Friday, August 16, at 12 noon. This notice is purely formal and is inserted in order to comply with the requirements of the Companies Acts. All creditors have been, or will be, paid in full. The winding-up is on account of the amalgamation of the company's business.

LORD, TRENCH AND CO., LTD. (C.W.U.V., 10/8/29.) At an extraordinary general meeting of Lord, Trench and Co., Ltd., held at Dashwood House, Old Broad Street, in the city of London, on Tuesday, July 16, the subjoined special resolution was duly passed; and at a subsequent extraordinary general meeting held at 48, South Drive, St. Annes-on-Sea, on July 31, 1929, was duly confirmed: "That the company be wound up voluntarily; and that Mr. Walter Gerald Vann, of Dashwood House, Old Broad Street, London, E.C.2, chartered accountant, be appointed liquidator for the purposes of such winding-up."

PRENTICE BROTHERS, LTD. (C.W.U.V., 10/8/29.) At an extraordinary general meeting, held at the company's offices, The Chemical Works, Stowmarket, on July 15, the following special resolution was duly passed; and at a subsequent extraordinary general meeting held at the same place on July 30, 1929, was duly confirmed: "That it is expedient to effect an amalgamation of this company with Joseph Fison and Co., Ltd. and with Packards and James Fison (Thetford), Ltd., and that with a view thereto this company be wound up voluntarily; and that Robert Ernest Fisk, of 2, Bridge Street, Stowmarket, be appointed liquidator for the purpose of such winding-up." Notice is given that a meeting of the creditors will be held at the Chemical Works, Stowmarket, Suffolk, on Friday, August 16, 1929, at 12 o'clock noon. This notice is purely formal and is inserted in order to comply with the requirements of the Companies Acts. All creditors have been, or will be, paid in full. The winding-up is on account of the amalgamation of the company's business.

Bankruptcy Information

LORIMER, John Arthur, and LORIMER, William Riddell Dick, trading as the SCOTTISH STANDARD PETROLEUM CO., 163, West George Street, Glasgow. (S.B., 10/8/29.) Estates sequestrated August 1. First meeting at 12 o'clock noon, on Thursday, August 15, in the Faculty Hall, St. George's Place, Glasgow.

New Companies Registered

BARNSLEY SYNDICATE, LTD.—Registered as a "private" company on July 31, with a nominal capital of £1,000 in £1 shares. Objects: To acquire the Mottram Wood Colliery and the freehold lands and buildings thereon, and beds of coal belonging thereto, to adopt an agreement between R. M. Williams and S. K. Robson of the first part, M. R. Proudlock of the second part, the Financial and Investment Co., Ltd. of the third part, and W. C. Roland (as trustee for this company) of the fourth part, and to carry on the business of colliery owners, manufacturers of coke and other products of the carbonisation of coal, and coal briquettes or other patent fuel, etc. The life directors are: R. E. Williams, S. L. Robson, M. R. Proudlock, W. S. Jones, Sir Hugh Nugent, Bt., and W. J. Harris. Solicitors: Vertue, Son and Churcher, 19, Hanover Square, London, W.1.

THE ECLIPSE DEVELOPMENT CO., LTD.—Registered as a "private" company on July 31, with a nominal capital of £50,000 in £1 shares. The objects are to adopt an agreement with Mellowes and Co., Ltd., to hold shares and securities of, promote, form, issue and be interested in any company or companies, whether formed under British, foreign, or Colonial law for the carrying on of all kinds of business not competing with the businesses carried on by the companies mentioned in the above agreement, to underwrite shares and interests in any company promoted by this company, etc. The directors are: T. E. L. Oakley; H. A. Mellowes (director, Mellowes and Co., Ltd.); G. R. Slater (appointed by Mellowes and Co., Ltd.); W. L. Chance (appointed by Chance Brothers and Co., Ltd.); and R. A. Pilkington (appointed by Pilkington Bros., Ltd.). If Mellowes and Co., Ltd., Chance Brothers and Co., Ltd., or Pilkington Bros., Ltd. cease to hold 5,000 shares in respect of each nominated director, the nominated directors in respect of such 5,000 shares shall cease to be directors. The registered office is at 26, Victoria Street, Westminster, London, S.W.1.

HANOVER FINANCE CORPORATION, LTD.—Private company. Registered July 31. Capital, £1,000 in £1 shares. Objects: To undertake and conduct any business, undertaking, transaction or operation, whether mercantile, commercial, financial or otherwise, to carry on the business of colliery owners, manufacturers of coke and other products of the carbonisation of coal, and of coal briquettes or other patent fuel, etc. Secretary, W. C. Poland. Solicitors: Vertue, Son and Churcher, 19, Hanover Square, London, W.1.

THE IMPERIAL SMELTING CORPORATION, LTD.—Registered as a "public" company on August 3, with a nominal capital of £7,500,000 in £1 shares (500,000 preference and 7,000,000 to be issued either as preference or ordinary shares). The objects are to acquire, hold or dispose of the whole or any portions of the shares or loan capital, or the assets or undertaking of the National Smelting Co., Ltd., or other companies, to carry on in any part of the world and more especially in any part of the British Empire all kinds of mining and quarrying operations; to search for, get, crush, win, quarry, smelt, calcine, refine, dress, amalgamate, manipulate and prepare for market, ores, metals, alloys, iron, coal, stone, clays, precious stones and deposits of all kinds; to carry on all kinds of metallurgical operations, chemical operations, and experiments and researches, and to carry on the business of manufacturers of and dealers in chemicals and chemical substances and all kinds of sulphuric and other acids and alkalis, manufacturers of and dealers in fertilisers, manures, fats, dips, sprays, vermifuges, fungicides, medicines and remedies of all kinds; manufacturers of and dealers in explosives, ammunition and munitions of war, armaments and guns, iron and steel masters, brass and iron founders, machinists, colliery and quarry proprietors, general engineers and contractors, manufacturers of and dealers in cement, glass, bricks, tiles, pottery and artificial stone, etc. Minimum cash subscription is 7 shares. Solicitors: Linklaters and Paines, 2, Bond Court, Walbrook, London, E.C.

Russian Potash Production

A RECENT RUSSIAN REPORT indicates that 30,000 tons of crude potassium salts will be produced at Solikamsk in the economic year 1929–30, and 250,000 tons in 1930–31. By 1932–33 the production will rise to 1½ million tons of crude potassium salts annually. In the five years ending 1934 about 34 million roubles will be spent in the exploitation of the Solikamsk deposits.